DOE/EM-0232

Volume II: Site Summaries March 1995

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Estimating the Cold War Mortgage

The 1995 Baseline Environmental Management Report

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Table of Contents
VOLUME II SITE SUMMARIES

READER'S GUIDE TO THE SITE SUMMARIES

INTRODUCTION

Volume II presents the site data that was used to generate the Department of Energy's (DOE) initial Baseline Environmental Management Report (BEMR). The raw data was obtained by DOE field personnel from existing information sources and anticipated environmental management strategies for their sites and was tempered by general assumptions and guidance developed by DOE Headquarters personnel. This data was then integrated by DOE Headquarters personnel and modified to ensure that overall constraints such as funding and waste management capacity were addressed.

The site summaries are presented by State and broken out by discrete activities and projects. The Volume I Glossary has been repeated to facilitate the reader's review of Volume II.

The information presented in the site summaries represents the best data and assumptions available as of February 1, 1995. **Assumptions that have not been mandated by formal agreement with appropriate regulators and other stakeholders do not constitute decisions by the Department nor do they supersede existing agreements.** In addition, actions requiring decisions from external sources regarding unknowns such as future land use and funding/scheduling alternatives, as well as internal actions such as the Department's Strategic Realignment initiative, will alter the basis and general assumptions used to generate the results for this report.

Consequently, the numbers presented in the site summaries do not represent outyear budget requests by the field installations.

SITE SUMMARY FORMAT

The site summaries provided in this volume give specific information about the activities and projected costs at each site as requested by the National Defense Authorization Act. The site summaries are organized alphabetically by State. Each summary provides a brief discussion of the site's current, and future missions followed by discussions of the projects and activities necessary to remediate the site. Costs and schedules are also provided. The projects are divided into five activities (as defined by Volume I, Section 2.3): environmental restoration, waste management, nuclear material and facility stabilization, landlord activities, and program management.

The cost tables provide costs for the activities identified in the site summaries. The annual costs are provided for each year from 1995 through the year 2000, and then 5-year average annual costs are provided until the project or activity is complete. Costs for all five activities at sites that have only environmental restoration missions — FUSRAP, UMTRA, and Nevada Offsites — are typically included within the scope of environmental restoration activities.

Waste Management support activities that the Environmental Management program performs at facilities managed by other DOE programs, such as the laboratories operated by Energy Research and Defense Programs, will continue for the foreseeable future. However, for the purpose of this analysis, waste management support of other DOE programs was truncated in 2030 or six years after the completion of environmental restoration activities.

APPROACH FOR THE SITE SUMMARIES

To ensure compliance with the requirements set forth in the National Defense Authorization Act (Volume I, Appendix A), DOE Headquarters developed a guidance package instructing the field installations on how to prepare their cost data and site summaries. The guidance was refined by conferring with congressional staffers, stakeholders, and DOE field office representatives. The guidance included relevant portions of the overall methodology (Volume I, Appendix C) and national assumptions regarding the Environmental Management program (Volume I, Section 3.3).

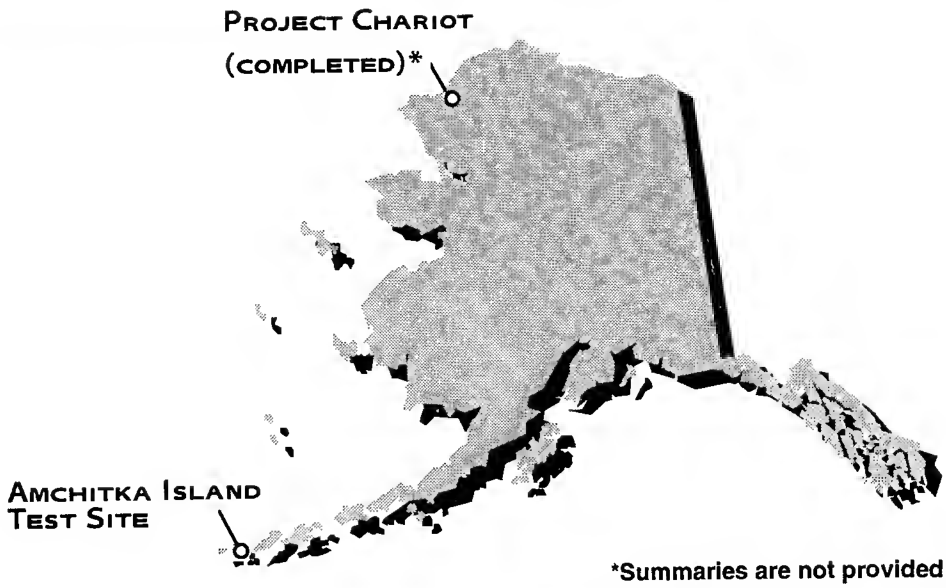
The field compiled their data and initial write-ups using existing information sources and professional judgement (regarding anticipated outcome of undefined segments of their scope that were not addressed globally by the guidance package). These initial submittals were reviewed by Headquarters program managers and BEMR project representatives, and returned to the field with specific recommendations.

Following the field's second submission of their site summaries, BEMR project representatives integrated the results in accordance with the methodology defined in Appendix C of Volume I. Additional review cycles were conducted by field and headquarters representatives after the integration model compiled and modified the field submittal to meet funding, waste capacity, and other programmatic constraints. The results of this iteration were used to form the base case analysis as defined in Section 3 of Volume I.

SITE SUMMARY RESULTS

The numbers shown in the site summaries' cost tables for 1995 reflect the Congressional appropriation. Costs portrayed for 1996 reflect the Department's most recent Congressional Budget submittal. The numbers presented for 1997-2000 reflect the funding level required to meet existing compliance agreements as identified by the Environmental Management program's recently conducted budget shortfall analysis (Volume I, Section 4.1.1). Outyears funding is capped at the FY 2000 level.

To maintain consistency with FY 1995-2000 numbers already published by the Department as noted above, the first 6 years of cost data are reported in *current year dollars*. However, *constant dollars* are used for both the outyears and the total cost as it is a more appropriate approach for long-range cost projections.



*Summaries are not provided for facilities with completed remedial actions.

ALASKA

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Alaska - Amchitka	241	1,051	100	100	100	100

* *Costs for FY 1995 raflect Congrassional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assuma 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Alaska - Amchitka	235	100	46	32	18	9	7

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Alaska - Amchitka	7	2	0	0	0	0	0	2,480

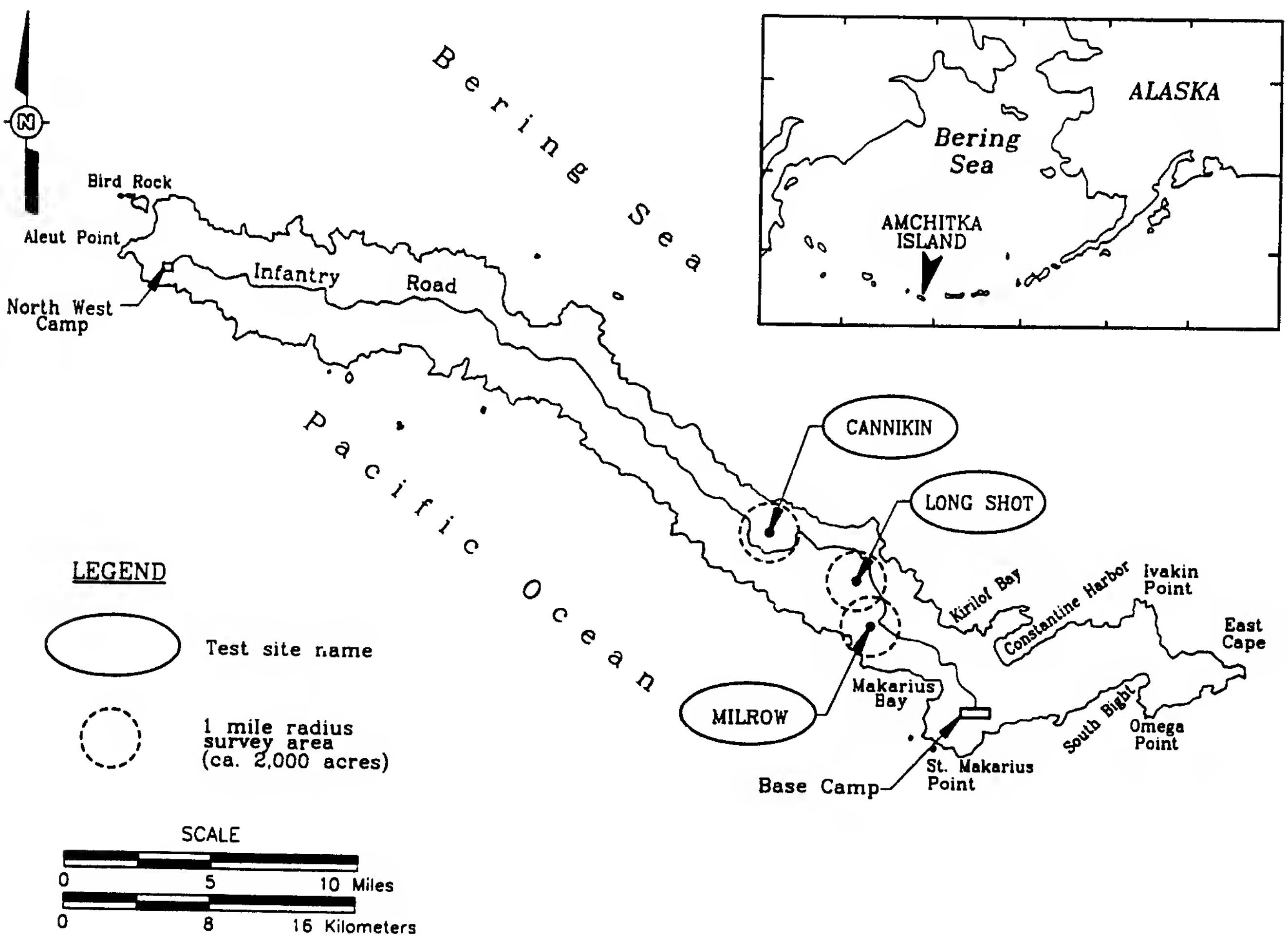
** *Costs raflact a five-yaar avaraga in constant 1995 dollars, axcapt in FY 1995 - 2000, which is a six-year avarage.*

*** *Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

AMCHITKA ISLAND TEST SITE
(Nevada Offsite Program)

The Amchitka Island Test Site location is administered by the Nevada Operations Office. A more thorough description of the environmental activities managed by the Nevada Operations Office can be found in the Nevada Site Summary. All costs for waste management activities, program management, and relevant landlord activities attribute to the Department are provided for within the scope of environmental restoration. There are no offsites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent defense.

Amchitka Island is the southernmost island of the Rat Island Group in the Aleutian chain.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	100	1,051	141	0	100	100

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	235	100	46	32	18	9	7

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	7	2	0	0	0	0	0	2,480

** *Costs reflect e five-yeer everage in constent 1995 dollars, except in FY 1995 - 2000, which is a six-yeer averege.*

*** *Totel Life Cycle is the sum of ennuel costs in constant 1995 dollers.*

PAST, PRESENT, AND FUTURE MISSIONS

Amchitka was the site of three nuclear detonations, conducted October 1965, October 1969, and November 1971. The first detonation, Long Shot, was a nuclear test detection research experiment. The next detonation, Milrow Shot, was a high-yield seismic calibration test. The last detonation, Cannikan Shot, was a test of a proposed warhead for the Spartan missile.

There are numerous locations associated with the Amchitka Site; however, responsibility for the various sites has not been assigned since the U.S. Army Corps of Engineers, U.S. Navy, U.S. Fish and Wildlife Service, and the Department have all conducted activities at this location. The vicinity of the site is being monitored as part of the Long-Term Hydrological Monitoring Program.

ENVIRONMENTAL RESTORATION

Funding for this activity provides for the continued synthesis and evaluation of information collected during the monitoring of the Amchitka Site in Alaska. The activity will define the magnitude and extent of contamination and the risks associated with that contamination through the evaluation of information on the two sites. This process will include the characterization of the physical setting and the testing area, the definition of the occurrence of contamination, and the identification of the pathways to reach a potential receptor. The risks to receptors will also be calculated using standard risk assessment procedures. Should risks exceed acceptable limits, remedial actions at the Alaska test sites will be initiated. For this estimate,

remediation was assumed to include removal of drilling mud pits, landfills, and auxiliary facilities (sewage lagoon, Kirilof dock, top camp, drums and debris, south hangar, and hazardous waste storage area) formerly associated with the testing on Amchitka Island. These remediation activities were assumed to begin and be complete in 1996.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Amchitka Island Test Site.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration							
Assessment	24	0	0	0	0	0	0
Remedial Actions	158	0	0	0	0	0	0
Surveillance And Maintenance	54	100	46	32	18	9	7
Total	235	100	46	32	18	9	7

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration								
Assessment	0	0	0	0	0	0	0	143
Remedial Actions	0	0	0	0	0	0	0	945
Surveillance And Maintenance	7	2	0	0	0	0	0	1,392
Total	7	2	0	0	0	0	0	2,480

* Costs reflect a five-year average in constant 1995 dollars, except in FY 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Environmental Restoration	235	100	46	32	18	9	7	

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	7	2	0	0	0	0	0	2,480

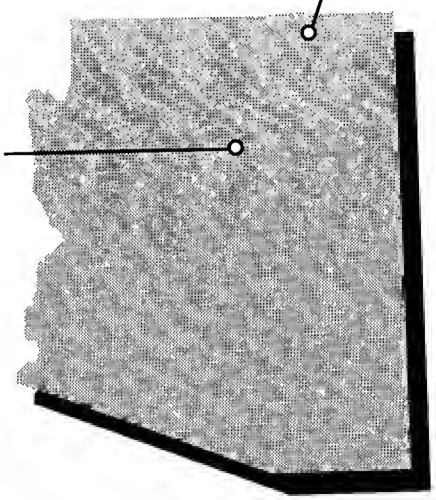
* *Costs reflect a five-year average in constant 1995 dollars, except in FY 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Complete Assessment	1996
	Complete Remediation	1996
	Complete Surveillance and Maintenance	2032

For further information on this site please contact: *Public Participation Office* *(702) 295-4652*
Public Affairs Office *(702) 275-3521*
Technical Liaison: Bobbie McClure *(702) 295-1862*



*Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for these facilities are provided in the table below.

ARIZONA

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Completed UMTRA Surveillance & Monitoring	1,589	2,096	3,483	7,616	9,125	6,776

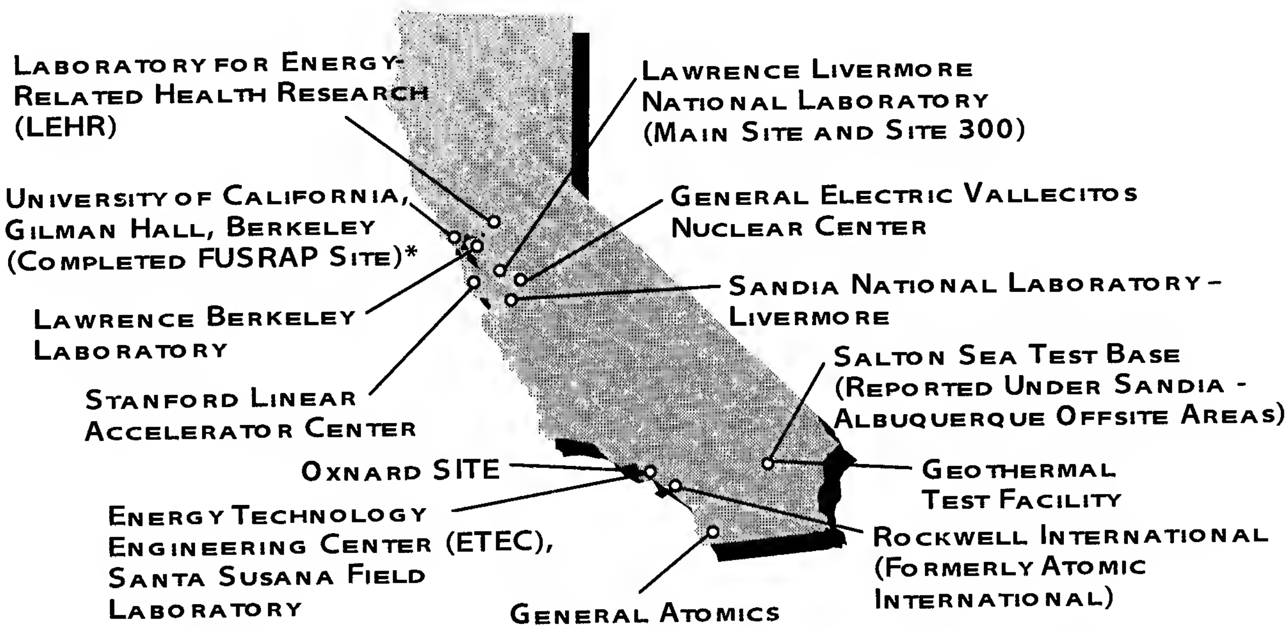
* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Completed UMTRA Surveillance & Monitoring	5,430	9,285	9,879	13,619	0	0	0	196,495

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*



* Summaries are not provided for facilities with completed remedial actions.

CALIFORNIA

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Energy Technology Engineering Center	8,494	13,125	17,025	14,852	14,633	14,541
General Atomics	2,700	3,040	5,077	4,062	0	0
General Electric Vallecitos Nuclear Center	360	105	764	2,761	3,890	3,445
Geothermal Test Facility	7,962	7,595	14,879	14,551	13,903	14,650
Laboratory for Energy-Related Health Research	7,057	7,321	5,289	3,549	2,823	3,004
Lawrence Berkeley Laboratory	13,905	13,175	12,520	12,232	12,393	14,753
Lawrence Livermore National Laboratory	70,710	88,360	79,534	87,531	91,768	90,763
Oxnard	3,500	7,725	3,713	1,639	0	0
Sandia National Laboratories - Livermore	4,904	5,476	4,883	4,932	2,339	2,299
Stanford Linear Accelerator Center	6,259	6,107	6,370	6,692	6,837	7,009
Total	125,851	152,029	150,054	152,801	148,586	150,464

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 raflect EM budget submission, costs for FY 1997-2000 raflact Budget Shortfall Scenario, costs for shadad area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Energy Technology Engineering Center	12,737	23,881	22,152	4,310	966	233	0
General Atomics	2,699	0	0	0	0	0	0
General Electric Vallecitos Nuclear Center	1,689	679	580	549	469	401	342
Geothermal Test Facility	1,223	0	0	0	0	0	0
Laboratory for Energy-Related Health Research	4,575	971	841	732	625	6	0
Lawrence Berkeley Laboratory	11,793	9,584	7,087	7,062	7,060	6,977	5,672
Lawrence Livermore National Laboratory	80,919	79,753	58,311	52,264	49,497	47,118	38,343
Oxnard	2,763	0	0	0	0	0	0
Sandia National Laboratories - Livermore	3,726	3,714	3,714	3,714	3,714	3,714	3,010
Stanford Linear Accelerator Center	6,073	4,811	4,551	4,520	4,500	4,483	3,604
Total	128,196	123,393	97,234	73,152	66,831	62,931	50,972

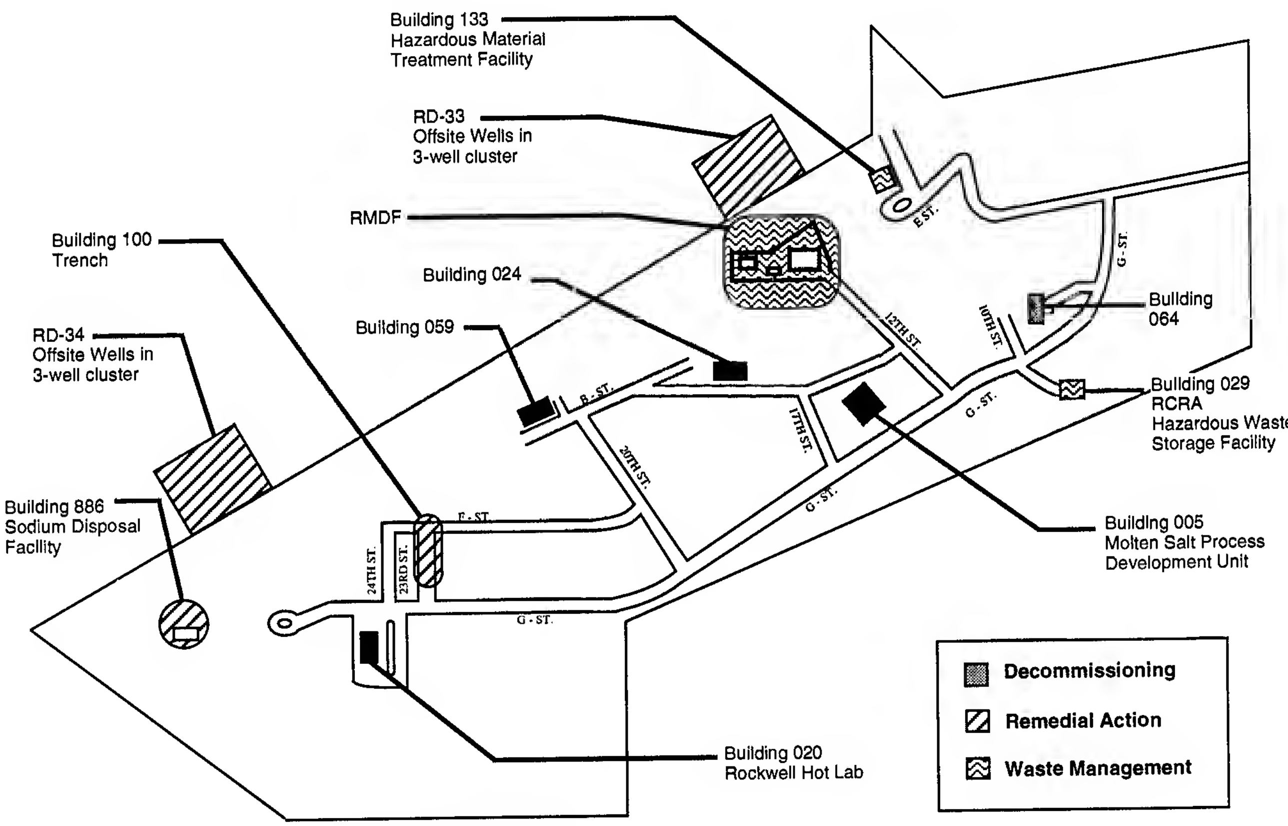
	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Energy Technology Engineering Center	0	0	0	0	0	0	0	334,131
General Atomics	0	0	0	0	0	0	0	16,194
General Electric Vallecitos Nuclear Center	0	0	0	0	0	0	0	25,233
Geothermal Test Facility	0	0	0	0	0	0	0	7,336
Laboratory for Energy-Related Health Research	0	0	0	0	0	0	0	43,310
Lawrence Berkeley Laboratory	0	0	0	0	0	0	0	287,975
Lawrence Livermore National Laboratory	6,628	2,291	1,500	1,280	519	0	0	2,173,027
Oxnard	0	0	0	0	0	0	0	16,576
Sandia National Laboratories - Livermore	0	0	0	0	0	0	0	130,240
Stanford Linear Accelerator Center	92	0	0	0	0	0	0	169,244
Total	6,720	2,291	1,500	1,280	519	0	0	3,203,268

** Costs reflect e five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year everage.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

ENERGY TECHNOLOGY ENGINEERING CENTER

The 2700-acre Santa Susana Field Laboratory is located in the Simi Hills of Ventura County, approximately 30 miles northwest of downtown Los Angeles, California. Department of Energy (DOE) operations are conducted in Rockwell International-owned and DOE-owned facilities on a 290-acre site. The Energy Technology Engineering Center portion of the Santa Susana Field Laboratory consists of Government-owned buildings occupying 90 acres of the 290-acre site. The land is owned by Rockwell International.



Note: Drawing is not to scale

Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	3,803	4,984	9,610	7,427	6,588	7,067
Waste Management	4,174	4,125	3,525	3,525	3,525	3,525
Nuclear Material and Facility Stabilization	0	3,400	3,400	3,400	1,500	1,250
Directly Appropriated Landlord	0	0	0	0	1,900	1,500
Program Management	517	616	490	500	1,120	1,199
Total	8,494	13,125	17,025	14,852	14,633	14,541

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	6,074	4,531	322	157	39	0	0	61,688
Waste Management	3,483	3,522	3,081	2,384	58	4	0	66,143
Nuclear Material and Facility Stabilization	2,005	13,386	17,350	634	344	28	0	170,736
Directly Appropriated Landlord	497	1,000	500	500	500	200	0	16,482
Program Management	677	1,443	899	636	25	1	0	19,081
Total	12,737	23,881	22,152	4,310	966	233	0	334,131

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

Part of Area IV at Santa Susana Field Laboratory was set aside in the mid-1950's for nuclear reactor development and testing. Research was primarily related to the development of sodium-cooled nuclear powerplants and space power systems using sodium and potassium as coolants. The Energy Technology Engineering Center occupies 90 acres within Area IV and was formed in the mid-1960's as a DOE laboratory for the development of liquid metal, heat-transfer systems in support of the Liquid Metal Fast Breeder Reactor Program. Operations at Building 20, the Rockwell International Hot Laboratory, were in support of Defense Programs while other facilities at the Energy Technology Engineering Center supported other DOE research programs, including the Systems for Nuclear Auxiliary Power program. Operations in all nuclear reactors and some other facilities in Area IV had ended by the mid-1970's.

Nuclear Energy activities at the Energy Technology Engineering Center were terminated at the end of 1994. Currently, Energy Technology Engineering Center's primary mission is applied engineering development of emerging energy technologies,

including conservation, environmental, solar, geothermal, and fossil energy. Environmental restoration and decommissioning activities began at this site in the early 1970's. In 1980, DOE began a systematic decontamination of remaining excess facilities formerly used for reactor development. As decommissioning activities are completed and buildings are certified for release for unrestricted use, they will be transferred to Rockwell International. Total Life Cycle costs for activities at this site are provided in the Estimated Site Total table.

The Office of Energy Efficiency is currently the landlord for the Energy Technology Engineering Center. It is anticipated that the facility landlord responsibilities including infrastructure management and surveillance and maintenance of current Office of Energy Efficiency facilities will be the responsibility of Environmental Management beginning in FY 1996.

Current long-term plans are to allow private sector companies and State, Federal, and foreign organizations to use a number of the facilities for an as-yet undefined period.

ENVIRONMENTAL RESTORATION

Research and development activities, past disposal and handling practices, and solvent use and disposal at the Energy Technology Engineering Center resulted in contamination of former research buildings, several existing and former waste management facilities, and site soil and ground water. Because environmental restoration activities have been conducted at the site since the early 1970's, many of the initially contaminated facilities have already been remediated. The Environmental Restoration Projects table contains the costs for environmental restoration activities at the Energy Technology Engineering Center. These costs are broken down by activity in the Environmental Restoration Activity Costs table.

Radioactive contaminated sites resulted from nuclear activities performed primarily in the 1960's. These activities included the operation of 10 reactors and 7 criticality test facilities, fuel fabrication, reactor and used fuel disassembly, small-scale laboratory work, and onsite storage of nuclear material. Over the period of 1974 to

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	6,074	4,531	322	0	0	0	0	60,709
Facility Decommissioning	0	0	0	157	39	0	0	979
Total	6,074	4,531	322	157	39	0	0	61,688

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

1989, a decommissioning activities program at the Energy Technology Engineering Center removed in excess of 99 percent of the man-made radioactivity generated at the site. The remaining unconfined radioactivity has been measured at less than 0.1 curie, which is much less than the radioactivity in the natural environment at Santa Susana Field Laboratory. Confined radioactivity is estimated to be less than 10 curies and is controlled in activated or contaminated structures that are locked, fenced, and within a guarded perimeter.

The remaining contaminated buildings at the Energy Technology Engineering Center currently in the Environmental Management program are Buildings 012, 020, 024, and 059. These buildings are undergoing or are scheduled for decommissioning activities.

Building 012, the System for Nuclear Auxiliary Power Critical Facility contains structural material contaminated by low-level radioactivity. The Rockwell International Hot Lab, which was contaminated as a result of storage of radioactive and other material used for research, has been undergoing decontamination since 1987.

Building 059, a System for Nuclear Auxiliary Power reactor test facility, contains aboveground and belowground units. The aboveground unit is referred to as the Large Leak Test Rig, and the belowground unit is referred to simply as Building 059. Both were contaminated as a result of research operations.

Past radioactive and hazardous material handling and disposal practices also resulted in contamination at several existing or former disposal units. Facilities undergoing environmental restoration include the Sodium Disposal Facility (Building 886), the Building 056 landfill, and the Radioactive Materials Disposal Facility. Previous operations at some of these facilities also resulted in the contamination of adjacent soils. The Sodium Disposal Facility, which is currently undergoing post-remediation independent verification as part of Resource Conservation and Recovery Act (RCRA) closure, was contaminated as a result of storage of radioactive materials. The Building 056 landfill contains contamination due to past disposal activities. Buildings 021, 022, and 075, which make up the Radioactive Materials Disposal Facility, contain radioactivity due to storage activities.

The use of solvents at or near the site, presumably in connection with rocket tests outside of Area IV, has resulted in ground-water contamination. The release of unknown quantities of cleaning solvents in the mid-1960's resulted in volatile organic compounds contamination of ground water. Ground water has also been contaminated in certain areas with tritium, gross alpha and beta radioactivity, and radium 226 and 228. Ground-water extraction and pumping at Energy Technology Engineering Center has limited the lateral extent of the ground-water contamination, but complete site characterization and ground-water remediation is continuing.

Environmental restoration activities include site-wide assessment, the development of a remedial action plan, and the remediation of contaminated media and the Building 056 Landfill. The results of an integrated site-wide soil and ground-water assessment will be used in developing a site-wide remedial action plan, which is scheduled for completion in FY 1995. The remedial action plan will identify all activities required to remediate the site for eventual release for unrestricted use. Soil remediation at contaminated buildings will be conducted as part of decommissioning activities. Energy Technology Engineering Center Solid Waste Management Units identified in the RCRA Facility Assessment will also be remediated and include the Building 056 Landfill whose closure is scheduled to start in FY 1996 and be completed in FY 1999.

Decommissioning activities involve DOE-owned surplus facilities and RCRA closure of the Sodium Disposal Facility and the

Radioactive Materials Disposal Facility. All cleanup is being conducted in a manner to permit unrestricted future use. The decommissioning activities also includes the surveillance and maintenance of facilities awaiting funding for decommissioning activities. Additional work includes the packaging, shipping, and disposal of both hazardous and nonhazardous waste generated by decommissioning activities.

Decommissioning activities have been completed at many of the former nuclear research sites and are currently underway at Buildings 012, 020, and 059. Completion is expected in FY 1996 at Buildings 012 and 059 and demolition of Building 020 in FY 2000. Decommissioning activities are scheduled to begin at Building 057, the Large Leak Test Rig, in FY 1998. RCRA closure of the former sodium disposal facility is scheduled for completion by the end of FY 1995. Decommissioning disposal tasks include the disposal of a moderator cask (a former onsite transport cask) and waste from the closure of the Sodium Disposal Facility, both scheduled to occur in FY 1995.

The Radioactive Materials Disposal Facility is used in support of decommissioning activities and contains a decontamination facility and temporary storage area for radioactive and mixed waste prior to offsite disposal. A small amount of transuranic waste from a previous decommissioning activities program is temporarily stored at the Radioactive Materials Disposal Facility. Following completion of other decommissioning activities requiring continuing operation of the Radioactive Materials Disposal Facility, it will also be decommissioned, probably beginning in FY 1999.

WASTE MANAGEMENT

Waste management operations at the Energy Technology Engineering Center include the disposal of hazardous, radioactive, and mixed waste, corrective activities at the Sodium Components Test Installation, and Tiger Team Waste Management related activities, as well as the continuity of operations at the Radioactive Materials Disposal Facility and Hazardous Waste Management Facility. Costs for the Hazardous Waste Facility are represented in the Major Waste Management Projects table.

Management of low-level mixed waste will include onsite treatment of several mixed-waste streams and onsite storage of mixed waste prior to offsite disposal. Waste management activities at the Energy Technology Engineering Center have included operations waste from the various research units. Presently, much of the waste handled is residual material from former research activities and decommissioning activities or environmental restoration generated waste from facility closures and remediation. Waste management activities will continue until all environmental restoration and facility stabilization activities are complete (FY 2025) (see the Waste Management Activity Costs table).

The Energy Technology Engineering Center that operates the Hazardous Waste Management Facility for the handling, treatment, and disposal of nonradioactive surplus and alkali metal waste. The Energy Technology Engineering Center is preparing a Part B Operation Plan for RCRA permitting of the Radioactive Materials Disposal Facility. A RCRA Part A permit application has been submitted to EPA and California. The Radioactive Materials Disposal Facility is currently operating under interim status.

The continuity of operations, performed in compliance with the RCRA permit, includes waste characterization, certification, minimization, packaging, and offsite disposal.

Corrective actions consist of developing a waste minimization plan, upgrading the Radioactive Materials Disposal Facility stack sampling system, and designing and installing a hazardous waste collection system.

Waste Treatment

Onsite treatment is currently performed on surplus sodium and three mixed waste streams. Sodium is currently treated at the thermal oxidation unit in Building 133 of the Hazardous Waste Management Facility, and the end product must be disposed as a hazardous waste. To replace this system, a new sodium cleaning unit at the existing Component Handling and Cleaning Facility will be completed in FY 1996. Operations at Building 133 will be phased out starting in FY 1998, and the building will undergo RCRA closure. All radioactive waste at the Energy Technology Engineering Center is stored and processed in the Radioactive Materials Disposal Facility prior to disposal.

Two types of low-level mixed waste will be recycled. The first waste type consists of sodium metal slightly contaminated with radioactive manganese to be converted to sodium hydroxide and used as a reagent to neutralize an electropolish solution. The second waste type consists of lead shielding with low-level radioactivity to be treated onsite by crystalline ice blasting and chelating treatment. The resultant lead material will be free of radioactivity and then be recycled. Treatment and disposal options for uncharacterized and future potential mixed waste will be evaluated after characterization is complete.

Waste Storage

Decommissioning-activities waste is stored temporarily in the Radioactive Materials Disposal Facility and the Hazardous Waste Management Facility. All radioactive and mixed waste generated at Energy Technology Engineering Center is stored at the Radioactive Materials Disposal Facility.

The total volume of characterized, low-level mixed waste currently stored at the Energy Technology Engineering Center is 3.58 cubic meters and includes the electropolish solution and high-efficiency particulate air filter system bag filters. There is one uncharacterized mixed-waste stream, paint chips potentially containing lead, but the current volume stored at Energy Technology Engineering Center has yet to be determined. The mixed transuranic waste stored onsite consists of one brick (0.001 cubic meters) of lead shielding. Future potential mixed waste streams include salt cores containing chromium; analytical waste; various waste resulting from decommissioning activities of Building 20 (high-efficiency particulate air filter pre-filters, high-efficiency

Major Waste Management Projects

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Hazardous Waste Handling Facility	333	0	0	0	0	0	0	2,000

*** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

particulate air filter bag filters, drain-line debris, vacuum catch barrels, and spray paint cans); and various waste from other future remedial and decommissioning activities. This waste is not fully characterized, and no estimate of total volume is available. The Radioactive Materials Disposal Facility is scheduled to undergo decommissioning activities starting in FY 1999.

Waste Disposal

Waste disposal occurs offsite at various DOE and commercial facilities. Radioactive activities waste will be disposed at the Nevada Test Site with the exception of high-efficiency particulate air filter bag filters to be disposed at the Envirocare Facility in Utah. All other radioactive waste except the mixed transuranic waste will be disposed at DOE Hanford. One brick of lead shielding contaminated with transuranic elements will be disposed at the Waste Isolation Pilot Project. Hazardous waste will be disposed at permitted treatment, storage, and disposal facilities.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The Energy Technology Engineering Center has not yet entered the Environmental Management facility stabilization program. The 44 facilities at the Energy Technology Engineering Center anticipated to enter the program include a sodium laboratory, a liquid metals chemical lab, and hazardous materials storage facilities. The resulting waste types will include low-level mixed, low-level, transuranic, and hazardous. It is assumed for purposes of this report these facilities will incrementally begin stabilization in 1996. Surveillance and maintenance will be performed to ensure any contamination existing will remain contained within the facility and the facility will not deteriorate prior to decommissioning activities and restoration activities. Repairs will be made when necessary to maintain the Federal Government's investment in the facility. See the Landlord Cost Estimate table for total costs in this area.

This report assumes the stabilization and maintenance process at the Energy Technology Engineering Center will be completed by 2025.

Waste Management Activity Costs

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-level Mixed Waste	231	188	97	18	0	0	0	2,895
Low-level Waste	115	523	137	122	51	4	0	4,875
Storage and Handling								
Low-level Waste	0	1	5	3	3	0	0	59
Hazardous Waste	3,137	2,810	2,842	2,241	4	0	0	58,315
Total	3,483	3,522	3,081	2,384	58	4	0	66,143

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Complete costs are found in the Nuclear Material and Facility Stabilization Projects table.

LANDLORD FUNCTIONS

The Office of Energy Efficiency is currently the landlord for the Energy Technology Engineering Center. It is anticipated the facility landlord responsibilities including infrastructure management and surveillance and maintenance of current Office of Energy Efficiency facilities will be the responsibility of Environmental Management beginning in FY 1996.

PROGRAM MANAGEMENT

Program management costs for both the environmental restoration program and the waste management program are found in the Program Management Cost Estimate table. Program management tasks supporting the environmental restoration program at the Energy Technology Engineering Center include:

- personnel management;
- maintenance of site-wide environmental data;
- strategic planning;
- financial management;
- interaction between DOE, external regulatory agencies, and the public;
- permitting;
- monitoring of project progress;
- provision of a technical advisory board;
- coordination of independent verification contractors; and
- administrative support.

Program management tasks supporting the waste management program at the Energy Technology Engineering Center include:

- facility management;
- personnel management and training;
- administrative support;
- document, guidance, and procedure preparation and revision;
- database and waste tracking management;
- liaison with DOE and external regulatory agencies;
- audits;
- budget preparation and control; and
- waste minimization planning.

Nuclear Material and Facility Stabilization Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	2,005	13,386	17,350	634	344	28	0	170,736

* *Costs raflect a fiva-year average in constant 1995 dollars, axcapt in FY 1995-2000, which is a six-year avaraga.*

** *Total Lifa Cycle is the sum of annual costs in constant 1995 dollars.*

DOE's Oakland Operations Office and the State of California have an Agreement-in-Principle providing for technical and financial support to the State for its activities at Energy Technology Engineering Center and five other DOE sites in California. The activities include environmental oversight, monitoring, access, emergency preparedness, and other initiatives to ensure compliance with Federal, State, and local regulations applicable at the site.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Energy Technology Engineering Center.

Landlord Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Directly Appropriated Landlord	497	1,000	500	500	500	200	0	16,482

* Costs reflect e five-yeer average in constent 1995 dollers, except in FY 1995-2000, which is e six-yeer everege.

** Total Life Cycle is the sum of ennuel costs in constent 1995 dollars.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	677	1,443	899	636	25	1	0	19,081

* Costs reflect a five-yeer average in constent 1995 dollers, except in FY 1995-2000, which is a six-year everege.

** Total Life Cycle is the sum of ennuel costs in constent 1995 dollars.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Management	3,483	3,522	3,081	2,384	58	4	0	66,143
Nuclear Material and Facility Stabilization	2,005	13,386	16,945	70	344	0	0	165,750
Directly Appropriated Landlord	497	1,000	500	500	500	200	0	16,482
Program Management	368	880	770	606	15	1	0	13,570
Total	6,353	18,788	21,296	3,560	916	205	0	261,946

** Costs raflact a five-year averege in constent 1995 dollars, excapt in FY 1995-2000, which is a six-yaar avaraga.*

*** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	6,074	4,531	322	157	39	0	0	61,688
Nuclear Material and Facility Stabilization	0	0	405	564	0	28	0	4,986
Program Management	309	563	129	30	10	0	0	5,511
Total	6,383	5,093	856	751	49	28	0	72,185

** Costs raflact a fiva-yaar evaraga in constant 1995 dollars, axcept in FY 1995-2000, which is e six-year everage.*

*** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Nuclear Material and Facility Stabilization		Fiscal Year
	Initiate Facility Stabilization	1996
	Complete Facility Surveillance and Monitoring	2025
Assessment & Remediation	Final Site-Wide Remedial Action Plan	1995
	Complete Site-Wide Assessment	2004
Environmental Restoration		Fiscal Year
Assessment & Remediation	Complete Site-Wide Remediation	2010
Decommissioning Activities (Nondefense)	Begin Decommissioning Activities	1995
	Complete RCRA Closure of the SDF[1]	1995
	Complete Decommissioning Activities of Buildings 012 and 059 (belowground)	1996
	Complete Closure of the Radioactive Material Disposal Facility	1999
	Complete RCRA Closure of Building 056 Landfill Decommissioning Activities (Defense)	1999
	Decommissioning Activities of Building 020 Support Rooms and Outside Area	1996
	Decommissioning Activities of Building 020 Storage Airlock and Basement	1997
	Decommissioning of Building 020	2000
Waste Management		Fiscal Year
	Construction of New Sodium Cleaning Unit for the CHCF[2]	1996
	Waste Management Complete	2025

[1] *Sodium*

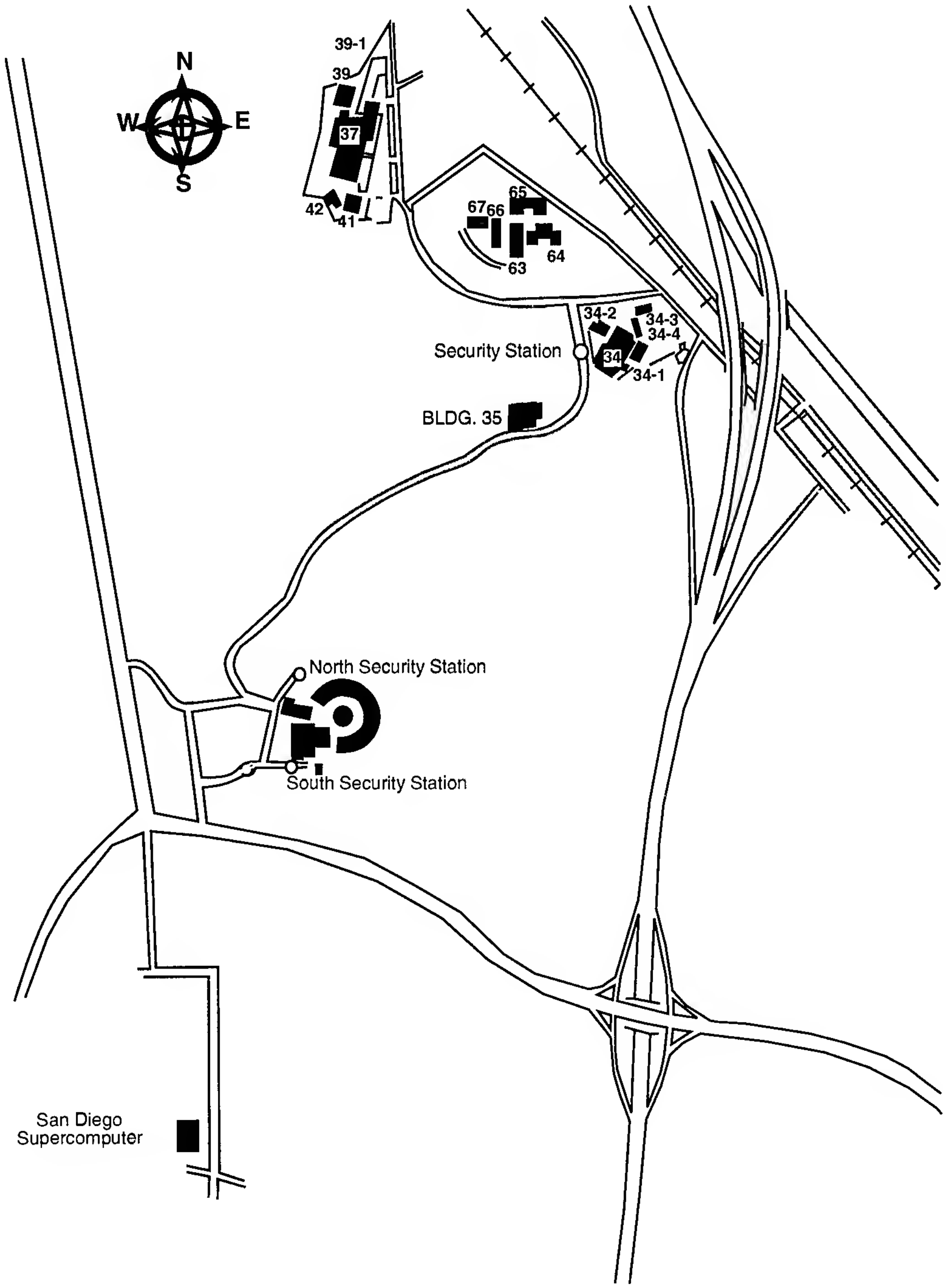
[2] *Component Handling and Cleaning Facility*

For further information on this site, please contact :

	Public Participation Office	*(510) 637-1812*
	Public Affairs Office	*(818) 586-5326*
	Technical Liaison: Rich Fallejo	*(510) 637-1639*

GENERAL ATOMICS

General Atomics occupies approximately 120 acres on two contiguous sites 13 miles north of San Diego, California. The two sites are referred to as the Main Site and the Serrano Valley Area.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	2,266	2,535	4,227	3,382	0	0
Program Management	434	505	850	680	0	0
Total	2,700	3,040	5,077	4,062	0	0

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	2,308	0	0	0	0	0	0	13,847
Program Management	391	0	0	0	0	0	0	2,348
Total	2,699	0	0	0	0	0	0	16,194

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

In support of the Department of Energy (DOE) and its predecessor agencies, as well as commercial customers, General Atomics has maintained a fully operational Hot Cell Facility at the Main Site for over 30 years. The Hot Cell Facility has been used for numerous examinations of DOE fuels, structural material, and instrumentation. General Atomics activities at the Hot Cell Facility primarily supported the High Temperature Gas-Cooled Reactor Program. The Hot Cell Facility is currently the only facility at General Atomics in the Environmental Management program. The Hot Cell Facility became contaminated with varying amounts of radioactive materials and small amounts of hazardous materials. General Atomics decided to shut down the Hot Cell Facility because of reduced demand and continuing private industrial development around the site. The decommissioning activities of the Hot Cell Facility will eliminate the potential for future environmental releases and make the Hot Cell Facility available for other uses. Environmental Management costs associated with the General Atomics facility are found in the Estimated Site Total table.

The Hot Cell Facility occupies Building 23 and the outdoor service yard at General Atomic's Main Site. The interior of Building 23 has approximately 7,000 square feet of floor space consisting of offices, three hot cells, an operating gallery, and auxiliary areas. The facility has been used for numerous examinations of DOE fuels, structural material, and instrumentation. Operations in Building 23 have been performed subject to Nuclear

Regulatory Commission Special Nuclear Material License No. SNM-696 and the California Department of Health Services Radioactive Material License No. 0145-80.

Building 23 is surrounded by 41,740 square feet of fenced service yard including several concrete pads used for staging heavy equipment and making material transfers into and out of the building. The remaining area is comprised of asphalt, soil, scattered small rocks, and disturbed vegetation. There is a 400-square-foot metal ancillary building and two aboveground waste storage tanks.

ENVIRONMENTAL RESTORATION

The Environmental Restoration Projects table provides costs for all environmental restoration activities at General Atomics. The Nondefense Funding Cost Estimate table shows the source of funding for environmental restoration activities. These costs are presented by activity in the Environmental Restoration Activity Costs table.

The examination of irradiated fuel, structural material, and instrumentation in the Hot Cell Facility has contaminated the facility with mixed fission and mixed activation products. Preliminary radiological surveys and a site evaluation show 2,250 cubic meters of low-level waste, low-level mixed waste, undetermined amounts of asbestos, lead, and other hazardous materials. Contamination is confined within the boundaries of the Hot Cell Facility, and health risks to General Atomics workers and the public are likely to be extremely limited. The exact nature and extent of soil and groundwater contamination are currently being defined, and potential risks will need to be reviewed after this assessment is completed.

The Hot Cell Facility is currently removing irradiated fuel material from the Thermionic Fuel Element and High Temperature Gas-Cooled Reactor and Reduced Enriched Research Test Reactor programs and the New Production Reactor program process. The Hot Cell Facility is also in the process of removing contaminated (low-level) equipment waste abandoned by the DOE Program offices mentioned above.

The Hot Cell Facility site will be released for unrestricted use to the Nuclear Regulatory Commission from General Atomics.

The Hot Cell Facility is presently undergoing decommissioning activities. The scope of the General Atomics decommissioning activities project includes dispensation of New Production Reactor program process and equipment waste and Reduced Enriched Research Test Reactor, Thermionic Fuel Element, and High Temperature Gas-Cooled Reactor irradiated fuel material. Hot Cell Facility decommissioning activities are currently being performed in three phases:

- Phase 1 provides for disposal of waste material and irradiated fuel materials remaining in the Hot Cell from previous DOE contracts; determination of the magnitude and extent of contamination through characterization; and preparation of all required Health & Safety and National Environmental Policy Act documentation.
- Phase 2 includes decommissioning activities of the Hot Cell Facility; decontamination outside Hot Cell Facility surface and subsurface areas; packaging, shipment, and disposal of radioactive and nonradioactive waste; and soil remediation.
- Phase 3 includes the closure site survey, submittal of the closure report, and obtaining approval from regulatory agencies and DOE for release of the Hot Cell

Facility site for unrestricted use.

Site and waste characterizations are being performed. Detailed characterization will include:

- radiological surveys to determine the locations and concentrations of radiological contamination,
- hazardous material surveys to identify and locate hazardous materials and waste contamination, and
- asbestos surveys to identify the extent and nature of asbestos contamination.

Decontamination operations at the Hot Cell Facility are currently scheduled to commence in FY 1995. The standard approach will be to use simpler and more passive methods first, advancing to more aggressive methods as needed. Passive decontamination techniques will be used when indicated as appropriate by the results of radioactive surface characterization. These techniques include standard vacuuming, damp cloth wiping, and, to a limited degree, hand washing/scrubbing operations. When these passive methods fail to reduce surface contamination to releasable levels, more aggressive decontamination methods will be used. In order of preference, these methods are:

- dry abrasive blasting with a vacuum,
- scabbing and scarification, and
- washing with ultra-high-pressure water.

If contamination is found within Hot Cell Facility structural elements, demolishing the building will be reconsidered. The current plan is for DOE to remove all contamination from in and around the Hot Cell Facility and return the facility to General Atomics for unrestricted use. The costs of the Hot Cell Facility decommissioning will be split between DOE (76 percent) and General Atomics (24 percent).

WASTE MANAGEMENT

Waste Treatment, Storage and Disposal Operations

Waste management activities associated with operational wastes are funded by Nuclear Energy and Defense Programs. Environmental

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	364	0	0	0	0	0	0	2,182
Facility Decommissioning	1,944	0	0	0	0	0	0	11,665
Total	2,308	0	0	0	0	0	0	13,847

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

restoration is funding waste characterization, packaging, and disposal of waste from the Hot Cell Facility. In addition, there is High Temperature Gas-Cooled Reactor irradiated fuel material waste. The total waste from the decommissioning of the Hot Cell Facility requiring disposal will be 2,250 cubic meters of low-level and low-level mixed, and an undetermined amount of hazardous waste. Decommissioning activities will not generate any transuranic, mixed-transuranic, or high-level waste. All low-level waste generated by decommissioning activities will be disposed of at the Hanford site in Washington State.

All mixed waste will be treated and disposed at DOE Hanford except:

- the elemental mercury mixed waste stream that will be the subject of an onsite treatability study or will be sent to Idaho National Engineering Laboratory for treatment;
- the corrosives mixed-waste stream that will be subjected to onsite neutralization, filtration, and stabilization; and
- the organic liquid mixed waste stream that will be subjected to incineration and stabilization at the Idaho National Engineering Laboratory.

All mixed waste storage and onsite treatment activities will be performed at General Atomics's Mixed Waste Management Facility. The current mixed waste onsite consists of residual stored low-level mixed material from previous DOE activities. The current inventory of characterized mixed waste totals 8.35 cubic meters. No additional generation of these characterized mixed waste streams is expected through FY 1997.

Preferred treatment options for characterized mixed waste streams include:

- compaction and stabilization of inorganic debris at DOE Hanford;
- macroencapsulation of elemental lead at DOE Hanford;
- stabilization of inorganic sludge and particulates at DOE Hanford;
- incineration and stabilization of organic liquids at Idaho National Engineering Laboratory; and
- onsite neutralization, filtration, and stabilization of corrosives.

An onsite treatability study will be conducted concerning the elemental mercury; however, the treatment option recommended by the DOE's Oakland Operations Office for the elemental mercury mixed waste stream is treatment at the Idaho National Engineering Laboratory. The estimated mixed waste volumes for onsite treatment and disposal at DOE Hanford are 1.46 cubic meters and 6.89 cubic meters, respectively.

The estimated volume of uncharacterized mixed waste streams is 32 cubic meters and includes corrosives, ignitables, organic liquids, inorganic debris, and aqueous liquids.

Future generation estimates of waste streams are 20 cubic meters of inorganic debris, which consists of miscellaneous scrap metal from the Hot Cell Facility decommissioning and high efficiency particulate air filters from the New Production Reactor, and 5 cubic meters of wastewater containing zinc and possibly other metals from the Hot Cell Facility decommissioning.

Mixed waste generated at General Atomics is stored at the Mixed Waste Management Facility, which is an interim status waste storage facility under RCRA. The Mixed Waste Management Facility consists of three areas that are designated as container storage areas for mixed waste. These areas are called Mixed Waste Management Facility 1, Mixed Waste Management Facility 2, and Mixed Waste Management Facility 3. The total storage capacity in these three areas is approximately 580 cubic meters (equivalent to 2,758 55-gallon drums), which far exceeds the current and projected mixed waste inventory at General Atomics.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The General Atomics site is already undergoing decommissioning and, therefore, will not require nuclear material and facility stabilization.

LANDLORD FUNCTIONS

The General Atomics facility is privately owned and operated. The DOE Office of Environmental Management maintains the Hot Cell Facility. The Hot Cell Facility maintenance costs are accounted for within the scope of environmental restoration. The Hot Cell Facility will be released for unrestricted use.

PROGRAM MANAGEMENT

Program management at the site supports the integration of environmental restoration activities at General Atomics. Associated costs are found in the Program Management Cost Estimate table. These activities include:

- tracking, collecting, and reporting costs;
- preparation of programmatic documents;
- coordinating permitting and public involvement;
- liaison with external regulatory agencies; and
- establishing, documenting, and maintaining technical, cost, and schedule baselines.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the General Atomics Center.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	391	0	0	0	0	0	0	2,348

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restorotion	2,308	0	0	0	0	0	0	13,847
Progrom Monogement	391	0	0	0	0	0	0	2,348
Totol	2,699	0	0	0	0	0	0	16,194

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

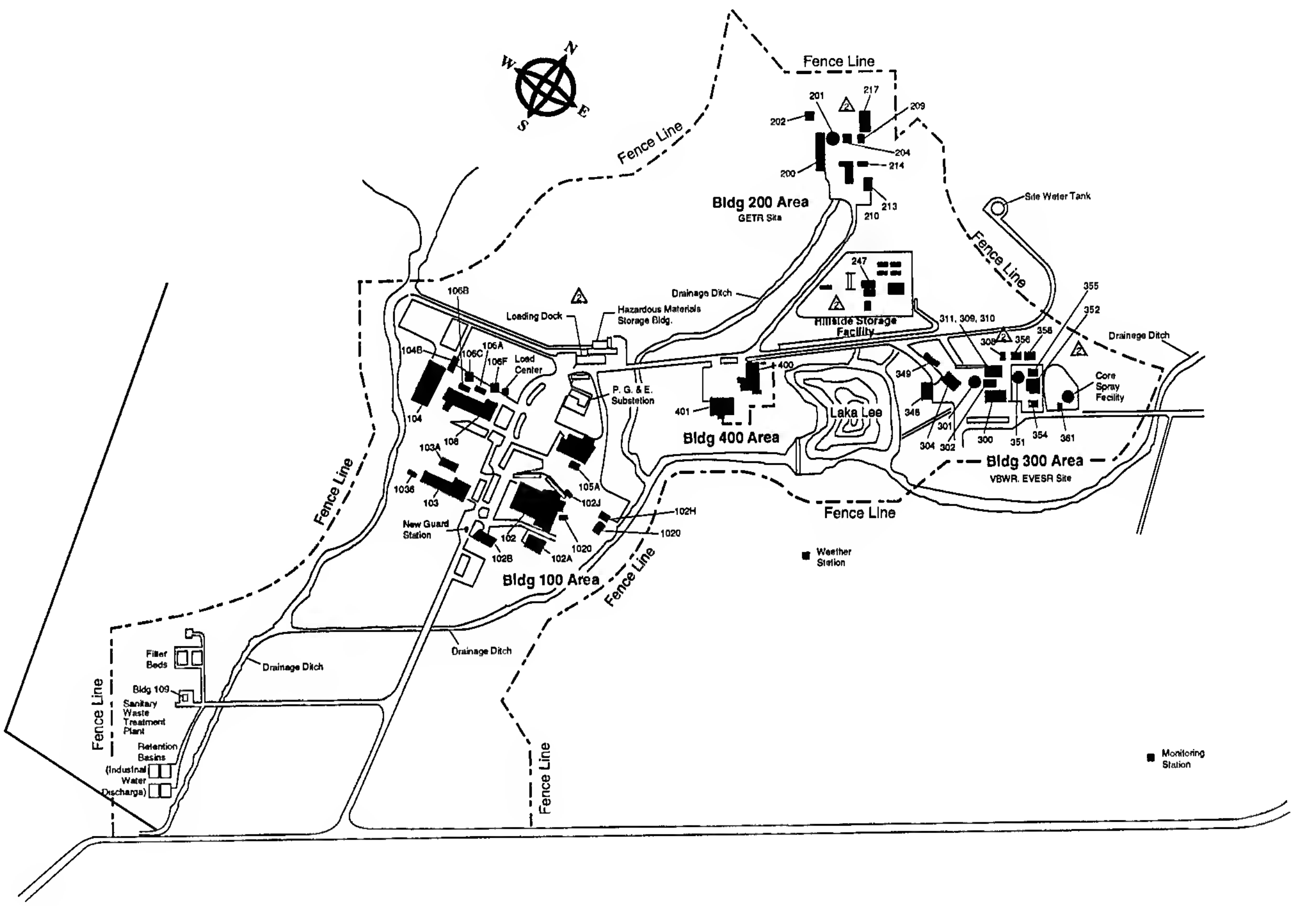
ACTIVITY	TASK	COMPLETION DATE
Environmental Restorotion		Fiscal Year
Hot Cell Facility Decommissioning Phase I	Ship Irradiated Fuel to ORNL for Interim Storage	1995
	Site and Facility Choracterizotion	1995
Hot Cell Focility Decommissioning Phase II	Begin Decommissioning	1995
	Complete Decommissioning	1997
Hot Cell Facility Decommissioning Phase III	Complete Final Closure Report	1998
	Releose Site with Unrestricted Use to General Atomics	1998

For further information on this site, please contact :

	Public Participation Office	*(510) 637-1812*
	Public Affairs Office	*(818) 586-5326*
	Technical Liaison: Rich Fallejo	*(510) 637-1639*

GENERAL ELECTRIC VALLECITOS NUCLEAR CENTER

The General Electric Vallecitos Nuclear Center, a nuclear facility privately owned and operated by General Electric, occupies approximately 1,600 acres in Pleasanton, Alameda County, California.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	240	80	584	2,321	3,450	3,045
Program Management	120	25	180	440	440	400
Total	360	105	764	2,761	3,890	3,445

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	1,447	584	499	480	410	351	300	21,807
Program Management	242	94	81	69	59	50	43	3,427
Total	1,689	679	580	549	469	401	342	25,233

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Two work locations at the General Electric Vallecitos Nuclear Center will be remediated of contamination caused by past Department of Energy (DOE) activity. These are the high-level Hot Cell No. 4 and the Emission Spectrograph Enclosure known as the "Glovebox". Both work locations have been idle for more than 10 years. The Hot Cell No. 4 and the Glovebox are the only locations at the General Electric Vallecitos Nuclear Center with which DOE is currently involved in remediation. The current DOE mission at the Center is the cleanup of Hot Cell No. 4 for return to General Electric and decontamination and disposal of the Glovebox. The costs for all Environmental Management activities at the site are presented in the Estimated Site Total table.

Hot Cell No. 4 is one of four hot cells constructed by General Electric in 1958 for post-irradiation examination of uranium fuel and irradiated reactor components. The other three hot cells are on the complex but DOE has had no involvement with them and is, therefore, not responsible for them. The hot cells are located in the Radioactive Materials Laboratory in Building 102. Between 1965 and 1967, Hot Cell No. 4 was decontaminated, equipped with a stainless steel liner to contain plutonium, and dedicated to the study of mixed oxide fuel rods in support of the Atomic Energy Commission's fast breeder reactor development programs. The fuel rod examination activities were conducted almost exclusively for DOE. In 1978, Hot Cell No. 4 was placed in a standby condition but was used by Lawrence Livermore National Laboratory for 6 months in 1981 and 1982, and by the General Electric Vallecitos Nuclear Center for corporate business for less

than 10 days per year thereafter. DOE plans to decontaminate Hot Cell No. 4, remove the alpha enclosure, and certify the cell free of transuranic contamination so it will be suitable to support future General Electric commercial usage.

The Glovebox is located in the Analytical Chemistry Laboratory in Building 103, and is a 3-foot-wide, 9-foot-long, 6-foot-high, stainless steel enclosure installed by the General Electric Vallecitos Nuclear Center in 1968 for emission spectrographic analyses of mixed-oxide fuel specimens for DOE. It has not been used since 1980, and DOE plans to decontaminate and dispose of the Glovebox.

ENVIRONMENTAL RESTORATION

The Environmental Restoration Projects table provides costs for all environmental restoration activities at General Electric Vallecitos Nuclear Center. The Nondefense Funding Estimate table shows the source of funding for environmental restoration activities. These costs are presented by activity in the Environmental Restoration Project Activity Costs table. No active processes or experiments involving DOE research are currently operating or planned at General Electric Vallecitos Nuclear Center. Fuel examination activities in Hot Cell No. 4 and the Glovebox resulted in radioactive contamination. On the basis of process knowledge, the likelihood of any hazardous components being found in either Hot Cell No. 4 or the Glovebox is small; however, the two locations and their associated waste have not been fully characterized for hazardous components, and the potential for the generation of mixed waste during decommissioning activities is unknown.

Contamination is currently confined within the boundaries of Hot Cell No. 4 and the Glovebox, and the potential health risk to the General Electric Vallecitos Nuclear Center site workers and the public is extremely low. However, site characterization has not been completed, and the potential risk will have to be reassessed once site contamination has been better profiled.

Hot Cell No. 4 and the Glovebox have been contaminated with various fission products and activation products as a result of fuel examination activities. Two radioactive waste streams will be generated during decontamination activities: 1) nonaqueous and

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	53	0	0	0	0	0	0	320
Facility Decommissioning	1,394	584	499	480	410	351	300	21,487
Total	1,447	584	499	480	410	351	300	21,807

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

remotely-handled transuranic waste in the form of construction debris and equipment, and 2) nonaqueous low-level waste, also in the form of construction debris and equipment.

On the basis of radiological surveys and site evaluations, the quantity of contaminated materials to be removed during decontamination activities is approximately 20 cubic meters. This material will be disposed of as transuranic waste. Additionally, removal of the steel liner will result in approximately 13 cubic meters of waste. Contamination is currently confined within the boundaries of Hot Cell No. 4 and the Glovebox.

Site and waste characterization of Hot Cell No. 4 and the Glovebox have not been performed. Initial characterization of the two locations will begin in FY 1995 and will include radiological surveys to determine locations and concentrations of radioactive contamination. Following characterization, it will be determined whether mixed waste will be generated through decommissioning activities. The facility will develop a schedule to conduct treatment technology assessment, followed by development of a site treatment plan to examine treatment alternatives for the mixed waste.

The standard decontamination approach will be to use simpler and more passive methods first, advancing to more aggressive methods if needed. When feasible, passive decontamination techniques will be applied as dictated by radioactive surface characterization. These techniques include standard vacuuming, damp cloth wiping and, to a limited degree, hand washing/scrubbing operations. When these passive methods fail to reduce surface contamination to acceptable levels, more aggressive decontamination methods will be used. In order of preference, these decontamination methods include dry abrasive blasting with a vacuum, scabbing and scarification, and washing with ultra-high-pressure water.

Preparations to begin decontamination operations, including the development of required documents, are scheduled to commence in FY 1997. Decommissioning and removal of the Glovebox is scheduled to commence at the end of FY 1997. Decommissioning of Hot Cell No.4 will commence in FY 1998. The removal and decommissioning of remote and manned waste in Hot Cell No. 4 will commence in FY 2000. Cost for decommissioning activities will be split between DOE and the General Electric Vallecitos Center. The division of costs will be negotiated in FY 1995. Treatment and disposal options will be considered once any mixed waste stream is generated and characterized.

Low-level and transuranic waste will be packaged to meet DOE Hanford's criteria. The low-level waste will be transported to Hanford for burial. The remotely-handled transuranic waste will be shipped to Hanford for storage. For the purpose of this cost analysis, disposal in the Waste Isolation Pilot Plant was assumed. The facility may need to design and license a new shielded storage and shipping container for transuranic waste to meet Hanford Site Radioactive Solid Waste Acceptance Criteria. The initial design and licensing of the new container will occur in FY 1997. Given the expected amount of transuranic waste, decommissioning activities are scheduled to occur over an extended period with completion expected in FY 2030.

WASTE MANAGEMENT

All DOE activities at the General Electric Vallecitos Nuclear Center, including waste management, are funded and managed within the scope of environmental restoration. No mixed wastes are currently present onsite and decommissioning activities will attempt to use

processes that will not result in the generation of low-level mixed waste or mixed transuranic waste. The quantity of mixed waste, if generated, will not exceed 2 cubic meters.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the General Electric Vallecitos Nuclear Center site.

LANDLORD FUNCTIONS

General Electric is the owner and operator of the General Electric Vallecitos Nuclear Center and is responsible for all landlord activities at the site.

PROGRAM MANAGEMENT

Program management at the site supports the integration of environmental restoration activities at the General Electric Vallecitos Nuclear Center and includes:

- tracking, collecting, and reporting costs;
- preparing programmatic documents;
- coordinating permitting and public involvement with appropriate units of the General Electric Vallecitos Nuclear Center;
- managing personnel;
- funding for independent verification contractor activity;
- acting as liaison with external regulatory agencies; and
- establishing, documenting, and maintaining technical, cost, and schedule baselines.

See the Program Management Cost Estimate table for costs associated with these activities.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the General Electric Vallecitos Nuclear Center.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	242	94	81	69	59	50	43	3,427

* *Costs raflact a fiva-yaar avaraga in constant 1995 dollars, axcapt in FY 1995-2000, which is a six-yaar avaraga.*

** *Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	1,447	584	499	480	410	351	300	21,807
Program Management	242	94	81	69	59	50	43	3,427
Total	1,689	679	580	549	469	401	342	25,233

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

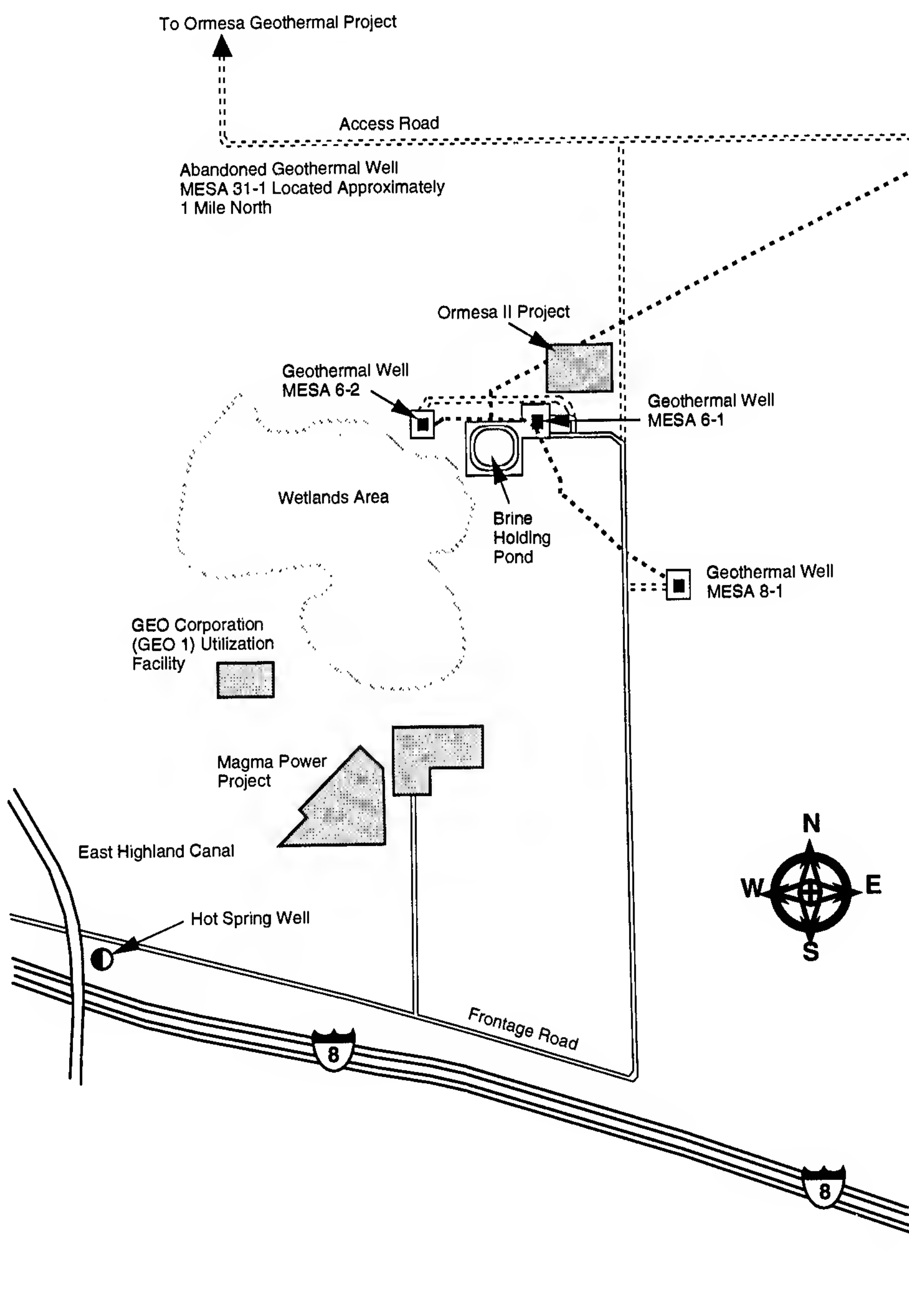
ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Preliminary Waste Characterization	1995
	Begin Decontamination and Removal of Glovebox	1997
	Begin Decontamination of Hot Cell No. 4	1998
	Release of Hot Cell No. 4 to General Electric	2030

For further information on this site, please contact :

Public Participation Office	*(510) 637-1812*
Public Affairs Office	*(510) 637-1809*
Technical Liaison: Rich Fallejo	*(510) 637-1639*

GEOTHERMAL TEST FACILITY

The East Mesa Geothermal Test Facility, an inactive Department of Energy (DOE) geothermal research facility, is in the Imperial Valley, Imperial County, California, about 20 miles east of El Centro and 1.5 miles north of Interstate Highway 8.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	0	0	2,000	2,000	1,000	1,500
Program Management**	7,962	7,595	12,879	12,551	12,903	13,150
Total	7,962	7,595	14,879	14,551	13,903	14,650

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assuma 3% annual inflation.*

** *Program Management Costs for FY 1996-2000 include DOE Oakland Operations Offica Costs.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	983	0	0	0	0	0	0	5,898
Program Management	240	0	0	0	0	0	0	1,438
Total	1223	0	0	0	0	0	0	7,336

** *Costs raflact a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycla is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

In 1968, the U.S. Bureau of Reclamation constructed the East Mesa Geothermal Test Facility for the investigation and development of geothermal resources in the East Mesa area. DOE became the site operator in 1978 and continued the site's energy research mission.

The 82-acre site includes a 6-acre, PVC-lined holding pond installed in 1972 to temporarily store and evaporate brine blowdown water, as well as untreated brine extracted in the geothermal exploration process. Geothermal research activities at the site were discontinued in 1987 as commercial scale geothermal power developed in the region.

Once restoration activities are complete, the facility will be turned over to the U.S. Bureau of Land Management for unrestricted use. Environmental Management program costs are presented in the Estimated Site Total table for the Geothermal Test Facility.

ENVIRONMENTAL RESTORATION

The Environmental Restoration Projects table provides costs for all environmental restoration activities at the Geothermal Test Facility. These costs are presented by activity in the Environmental Restoration Activity Costs table.

No active processes or experiments involving DOE research are currently operating or planned at Geothermal Test Facility. Sources of contamination are related to past operations at the site; however, hazardous waste may be generated during site restoration and disposed at a permitted Class I or II landfill.

Untreated brine extracted during geothermal exploration and brine blowdown water were stored in a holding pond at the facility. Storage of brine in the holding pond resulted in contamination of sediments due to the concentration of water soluble salts and the precipitation of minerals. The volume of contaminated sediments is estimated at 9,150 cubic meters. On the basis of previous sampling, the quantity of hazardous waste to be generated from restoration activities is expected to be minimal.

A field investigation report on the brine holding pond was prepared in 1992; and a site characterization study of the balance of the site was completed in 1993.

Contamination of the brine pond resulted from salts and minerals concentrated in sediment by evaporation. Decontamination activities will generate two waste streams: nonaqueous soil/debris contaminated with arsenic and nonaqueous, nonhazardous debris contaminated with salts and minerals.

During an asbestos survey conducted in 1992 three types of materials were identified as containing asbestos. These materials included:

- a joint compound used around pipe joints and flanges,
- cooling tower millboard, and
- floor tile and mastic inside the yellow laboratory building.

These asbestos-containing materials will be removed and disposed offsite at an appropriate disposal facility. Several other areas containing potentially airborne asbestos were remediated.

Under the terms of the lease agreement between DOE and U.S. Bureau of Land Management, the site must be restored to its original condition.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	57	0	0	0	0	0	0	343
Remedial Actions	926	0	0	0	0	0	0	5,554
Total	983	0	0	0	0	0	0	5,898

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

WASTE MANAGEMENT

No treatment of hazardous, radioactive, or mixed wastes occurs now or is anticipated in the future. Generated hazardous waste will be stored in accordance with generator requirements for non-permitted facilities. Any hazardous waste to be generated, by decontamination efforts, will be treated and disposed at appropriate facilities. Waste management at the Geothermal Test Facility is conducted within the scope of environmental restoration.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Geothermal Test Facility.

LANDLORD FUNCTIONS

The Department's Office of Energy Efficiency is currently the landlord at the Geothermal Test Facility and is responsible for associated activities and costs.

PROGRAM MANAGEMENT

Because the Geothermal Test Facility is an inactive site and no restoration activities are underway, there are no current site management tasks other than planning for future potential restoration efforts. Once funding is available for restoration, program management will include typical management tasks such as strategic planning, liaison with DOE and external regulatory agencies, scheduling, document preparation, budget control, and financial forecasting. See the Program Management Cost Estimate table for costs associated with these activities.

Program management costs include overall program management costs for the DOE Oakland Operations Office. These costs include funding for the agreements-in-principle program, grants, program support and waste management.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Geothermal Test Facility.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	240	0	0	0	0	0	0	1,438

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

***Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	983	0	0	0	0	0	0	5,898
Program Management	240	0	0	0	0	0	0	1,438
Total	1,223	0	0	0	0	0	0	7,336

Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

***Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

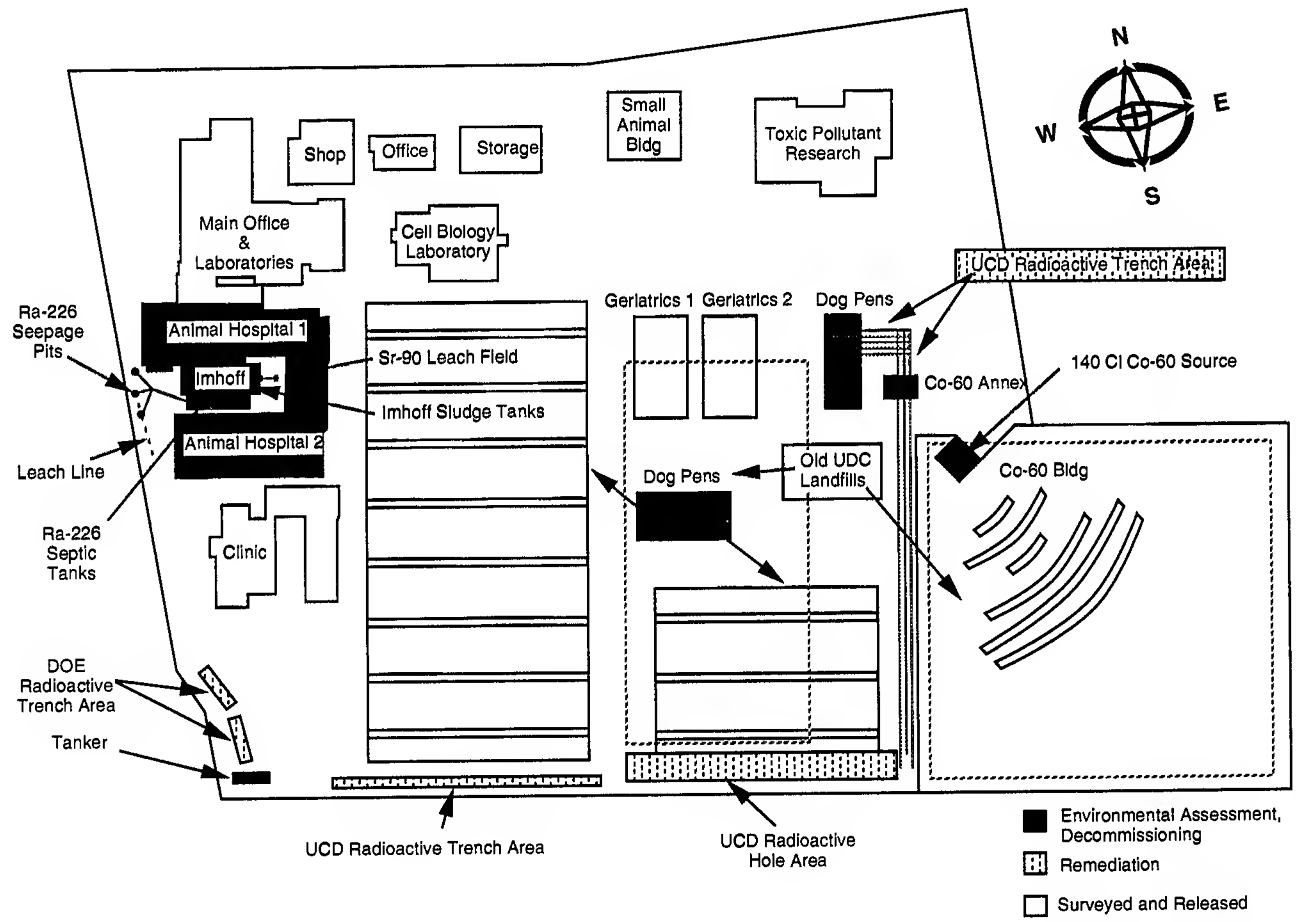
ACTIVITY	TASK	COMPLETION DATE Fiscal Year
Environmental Restoration	Complete Site Characterization	1997
	Start Site Remediation Activities	1998
	Complete Decommissioning and Site Remediation Activities	1999

For further information on this site, please contact :

Public Participation Office	*(510) 637-1812*	
Public Affairs Office	*(510) 637-1809*	
Technical Liaison: Rich Fallejo	*(510) 637-1639*	

LABORATORY FOR ENERGY RELATED HEALTH RESEARCH

The Laboratory for Energy Related Health Research, a former Department of Energy (DOE) facility, is located 1.5 miles south of the main campus of the University of California at Davis and is currently undergoing restoration activities. The 15-acre site is owned by the University of California at Davis and has been leased to DOE since 1958.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	5,838	5,566	3,550	2,253	1,532	1,626
Waste Management	0	421	429	0	0	0
Program Management	1,219	1,334	1,310	1,296	1,291	1,378
Total	7,057	7,321	5,289	3,549	2,823	3,004

* Costs for FY 1995 raflect Congrasslonal Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shadad area assume 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	3,236	940	803	611	522	6	0	33,822
Waste Management	127	0	0	0	0	0	0	752
Program Management	1,212	32	38	121	103	0	0	8,736
Total	4,575	971	841	732	625	6	0	43,310

** Costs reflect a five-yaar average in constant 1995 dollars, axcept in FY 1995 - 2000, which is a six-yaar avaraga.

*** Totel Life Cycla is tha sum of annuel costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The Laboratory for Energy Related Health Research facility consists of a main administration and office building, two animal hospitals, a specimen storage room, a laboratory and support building, waste treatment facilities, and outdoor dog pens. Research at the Laboratory originally focused on the health effects of chronic exposures to radionuclides, using beagles to simulate radiation effects on humans. The Office of Energy Research terminated its research program in 1988 and the buildings were transferred to the Environmental Management program. Complete costs to the Environmental Management program are presented in the Estimated Site Total table for the Laboratory for Energy Related Health Research.

In May 1994, the site was placed on Environmental Protection Agency's (EPA) National Priorities List under Comprehensive Environmental Response, Compensation and Liability Act. The schedule for cleanup activities is being negotiated with EPA and is expected to be formalized as part of the site's Federal Facility Agreement during FY 1995.

ENVIRONMENTAL RESTORATION

Environmental restoration activity objectives at the Laboratory for Energy Related Health Research include:

- assess the nature and extent of site contamination;
- determine and negotiate cleanup levels;
- decommission contaminated buildings;
- remove onsite radioactive, chemical, and mixed waste sources;
- remediate soils and ground water and underground tank systems, as required; and
- verify the site and associated facilities have been adequately cleaned and meet established criteria for transfer to the University of California at Davis for unrestricted use.

Prior to returning the Laboratory for Energy Related Health Research to the University of California at Davis, the remaining contaminated facility (Cobalt 60 Building) and 500 outside dog pens will require decommissioning activities. In addition, soil remediation may be required, and a treatment system for ground water may need to be designed. The Laboratory is scheduled to release the 18 site buildings to the University of California at Davis for unrestricted use by FY 1997. The Environmental Restoration Projects table provides costs for all environmental restoration activities at the Laboratory for Energy Related Health Research. The Nondefense Funding Estimate table shows the source of funding for environmental restoration activities. These costs are presented by activity in the Environmental Restoration Activity Costs table.

Remediation of the soils and the septic tank system may continue beyond FY 2000. The Laboratory for Energy Related Health Research facilities will be transferred to the University of California at Davis for unrestricted use once environmental restoration activities are completed. However, ground-water remediation, if required, may continue after the transfer of the facilities to the University of California at Davis.

The primary radionuclides used in research were strontium-90 and radium-226. Disposal of research-derived waste contributed to contamination in onsite trenches and possibly an onsite landfill. Soil, gravel, and ground water have been impacted by site waste handling and disposal. Ground water at the site has been found to contain nitrates, chromium, chloroform, tritium, and carbon-14 at levels above EPA primary drinking standards.

Decommissioning activities have been completed at many of the Laboratory for Energy Related Health Research facilities. One remaining contaminated building is currently undergoing decommissioning activities, which is scheduled to be completed in FY 1995.

Underground settling and domestic septic tank systems, potentially contaminated with radioactive and hazardous chemicals, will undergo characterization in FY 1995. The site also has more than 500 outdoor dog pens believed to be contaminated with radioactive materials and chlordane. These pens will undergo cleanup starting in FY 1995.

Radioactive waste was buried onsite by both the University of California at Davis and DOE in shallow unlined trenches in the south, southwest, and central areas. A six-acre, inactive, unlined, leaking landfill independently operated by the University of California at Davis, is also onsite and may contain contaminants due to disposal of Laboratory facility waste. Finally, thousands of research samples containing both radioactive and hazardous chemicals are onsite and must undergo characterization to allow offsite treatment or disposal.

Restoration activities at the Laboratory for Energy Related Health Research will include soil and ground-water assessment, remediation, and the decommissioning of certain facilities.

Site-wide soil characterization and assessment activities will consist of drilling and sampling soil borings in onsite burial trenches, leach fields, and seepage pits (University of California at Davis and DOE areas) as well as the characterization and remediation of underground tanks. It is estimated approximately 623 cubic meters of low-level radioactively contaminated soil and gravel are present onsite at depths ranging from a few inches to approximately 6 feet. The contaminated soil at these locations will be remediated as necessary.

Ground-water characterization and assessment will include installing and sampling deep and shallow ground-water monitoring wells. The extent of ground-water contamination is not fully characterized although preliminary data indicate onsite and offsite ground-water contamination. The data from a remedial investigation will be used to conduct a feasibility study of ground water and soil remediation if required.

The Remedial Investigation/Feasibility Study is scheduled for completion by FY 1997. The remedial design for soil and soil remediation are scheduled for completion by FY 2000. The remedial design for ground water is scheduled for completion by FY 2000. The disposal of characterization waste will be completed by FY 1997. Ground-water remediation costs for the Laboratory for Energy Related Health Research facilities are not included in the Baseline Environmental Management Report baseline. However, ground-water remediation, if required, is likely to consist of pumping and treatment.

The preliminary estimate of the volume of contaminated soil and ground water requiring disposal or treatment from FY 1995 on is 5,645 cubic meters of low-level and low-level mixed radioactive waste. All waste from restoration activities will be shipped to DOE Hanford.

The decommissioning activities at the two animal hospitals, the Specimen Storage Room, and the Imhoff facility have been completed, and the facilities are awaiting clearance by an independent verification. The Cobalt 60

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	1,194	0	0	0	0	0	0	7,167
Remedial Actions	773	112	95	8	7	6	0	5,775
Facility Decommissioning	1,269	828	707	603	515	0	0	20,880
Total	3,236	940	803	611	522	6	0	33,822

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Building decontamination will be completed in FY 1995, with independent verification in FY 1996. Outdoor dog pens will be removed from the site in FY 1996.

Waste resulting from decommissioning activities will consist of low-level waste including sludge, dry active waste, and contaminated soils, as well as, hazardous waste including asbestos, chemical, and biological waste. It is estimated decommissioning activities from FY 1995 onward will generate 440 cubic meters of low-level waste and 35 cubic meters of low-level mixed waste.

The environmental monitoring program at the Laboratory for Energy Related Health Research consists of air, ground water, surface water, soil, and radiation monitoring at routine intervals. The monitoring program will continue for the duration of site restoration activities.

WASTE MANAGEMENT

Given the fact DOE-funded research at the Laboratory for Energy Related Health Research has ceased, there are no ongoing routine operations associated with DOE programs producing waste. The Laboratory for Energy Related Health Research operates an Interim Status storage facility under a Resource Conservation and Recovery Act Part A Permit. The major waste streams identified consist of residual waste from past research activities and waste generated from the environmental restoration actions. To facilitate waste handling and loading, an existing onsite facility has been renovated to serve as a waste-staging facility.

Waste Treatment

Due to the lack of characterization data, the Laboratory for Energy Related Health Research has not identified treatment options for any of its mixed radioactive waste. No treatment of hazardous waste is conducted or will be conducted onsite.

Waste Storage

Storage of environmental restoration generated waste will occur at a renovated waste staging facility prior to disposal. The preliminary estimated volume of contaminated soil and ground water requiring treatment or disposal is 5,645 cubic meters of low-level waste and low-level mixed waste. The estimated volume of decommissioned waste from FY 1995 onward is 440 cubic meters of low-level waste and 35 cubic meters of low-level mixed waste.

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Storage and Handling								
Low-level Mixed Waste	127	0	0	0	0	0	0	752

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Waste Disposal

Hazardous waste will be disposed offsite at permitted treatment, storage, and disposal facilities. Low-level waste will be disposed of at the Hanford DOE site. The disposal site for low-level mixed waste is to be determined in the Federal Facility Compliance Act process.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Laboratory for Energy Related Health Research.

LANDLORD FUNCTIONS

The University of California owns the land at the Laboratory for Energy Related Health Research, and DOE owns the buildings. The Environmental Management program is responsible for quarterly monitoring and building surveillance and maintenance. The costs of these activities are accounted for within the scope of environmental restoration.

PROGRAM MANAGEMENT

Program management at the site supports the environmental restoration activities at the Laboratory for Energy Related Health Research. Associated costs are found in the Program Management Cost Estimate table. These activities include:

- tracking, collecting, and reporting costs;
- overseeing technical, health and safety, and quality assurance activities;
- preparing programmatic documents;
- coordinating permitting and public involvement;
- subcontracting;
- establishing, documenting, and maintaining technical, cost, and schedule baselines; and
- developing and implementing a waste minimization plan emphasizing waste reduction, segregation, and minimization.

A Memorandum of Agreement was executed between DOE and the University of California for the decommissioning activities of the Laboratory for Energy Related Health Research facilities. The Memorandum of Agreement identified the roles of DOE and the University of California at Davis

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	1,212	32	38	121	103	0	0	8,736

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

in the conduct of the environmental restoration project. Independent verification of decontamination projects will be performed by a contractor (the Oak Ridge Institute for Science and Education) to verify the facility has been decontaminated according to established cleanup goals. DOE's Oakland Operations Office has signed an Agreement-In-Principle with the State of California to ensure building decommissioning activities and site restoration activities comply with the State of California environmental regulations. As part of the Agreement-In-Principle, State technical staff will review major activity work plans and perform spot check surveys and onsite monitoring.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Laboratory for Energy-Related Health Research.

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	3,236	940	803	611	522	6	0	33,822
Waste Management	127	0	0	0	0	0	0	752
Program Management	1,212	32	38	121	103	0	0	8,736
Total	4,575	971	841	732	625	6	0	43,310

*Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

**Total Life Cycle is the sum of annual costs in constant 1995 dollars.

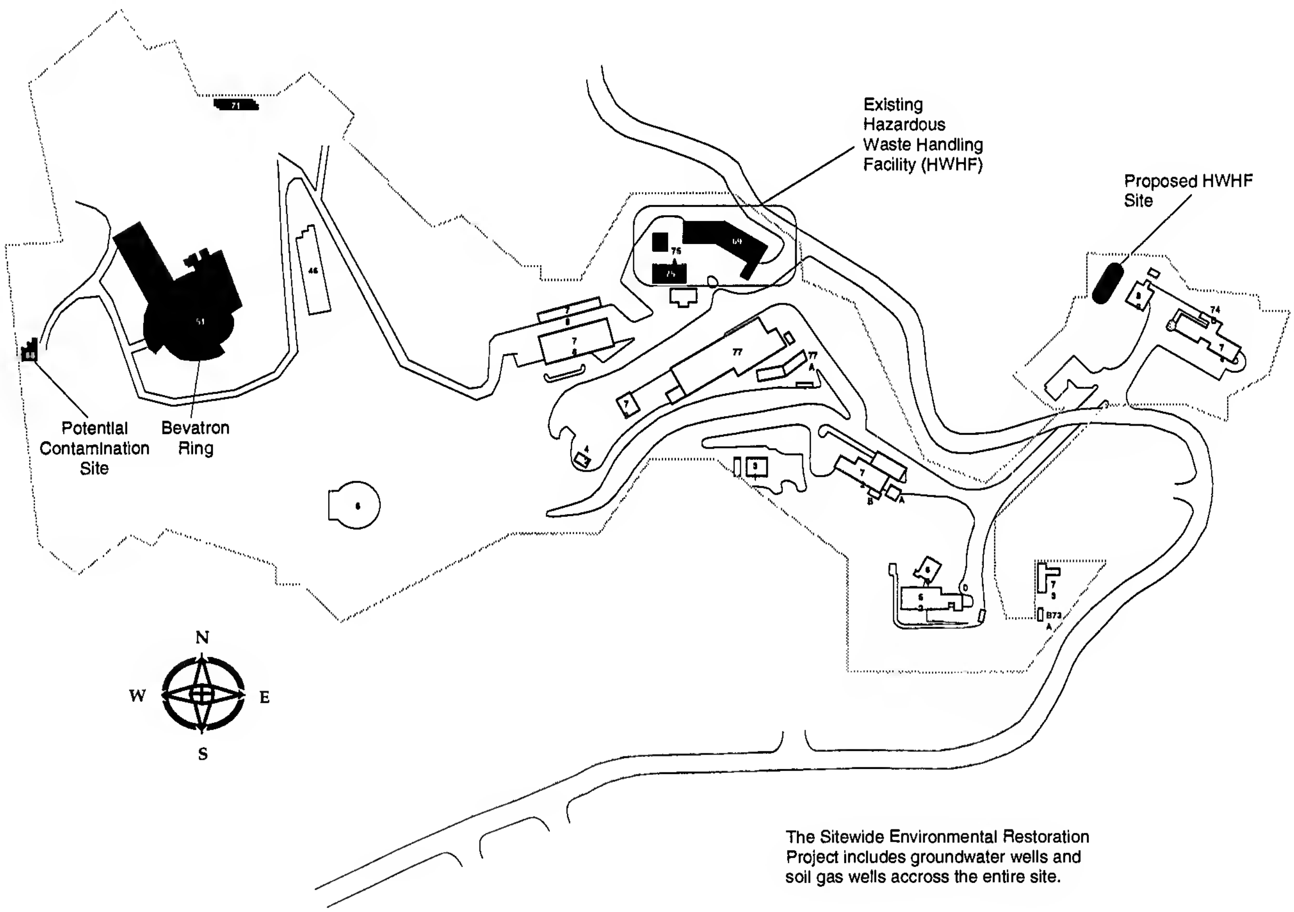
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
Characterization/Assessment Activities	Draft Site-Wide Remedial Investigation Report for Soil and Ground Water	1997
	Soil Remedial Design	2000
Remediation Activities	Soil Remediation	2000
	Ground Water Remedial Design	1997
	Outyear Remediation	2025
Decommissioning Activities	Decommissioning of Imhoff Building and Tank Remediation	1995
	Decommissioning of Tank Trailer	1995
	Decommissioning of Co-60 Building and Dog Pens	1995
	Outyear Decommissioning Activities	2020
Release to UCD	Imhoff Building Site, Underground Tanks, and Tank Trailer	1995
	Dog Pens and Co-60 Building	1997
Waste Management		Fiscal Year
	Incorporation of Treatment Evaluation of LLMW Waste Streams into Site Treatment Plan	1995
	Disposal of Existing and ER Waste	1997

For further information on this site, please contact : *Public Participation Office* *(510) 637-1812*
Public Affairs Office *(510) 637-1809*
Technical Liaison: Rich Fallejo *(510) 637-1639*

LAWRENCE BERKELEY LABORATORY

The 134-acre Lawrence Berkeley Laboratory site is located on the western side of Berkeley Hills adjacent to the University of California, Berkeley campus. The site is leased to the Department of Energy (DOE) by the University of California and is bordered on the north by single-family residences and on the west by multifamily dwellings, student residence halls, and commercial buildings.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	3,108	3,912	3,639	3,400	3,400	5,297
Waste Management	9,982	8,460	7,914	8,072	8,233	8,398
Program Management	815	803	967	760	760	1,058
Total	13,905	13,175	12,520	12,232	12,393	14,753

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	2,965	2,264	113	96	82	56	0	30,846
Waste Management	7,934	5,489	5,489	5,496	5,517	5,492	4,538	207,706
Program Management	895	1,831	1,485	1,470	1,461	1,429	1,134	49,422
Total	11,793	9,584	7,087	7,062	7,060	6,977	5,672	287,975

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The Lawrence Berkeley Laboratory has been leased to DOE since the early 1930's by the University of California for a wide range of energy-related research activities including research in nuclear and high-energy physics, accelerator research and development, materials research, research in chemistry, geology, and molecular biology, and biomedical research.

As part of Lawrence Berkeley Laboratory's energy research mission, the facility has developed and operated national experimental facilities including:

- three large accelerators such as the Bevatron, the Super Heavy Ion Linear Accelerator, and the 88-inch Cyclotron;
- several small accelerators;
- the National Center for Electron Microscopy;
- the Human Genome Center;
- a number of radiochemical laboratories;
- several large gamma irradiators;
- the National Tritium Labeling Facility; and
- the newly completed Advanced Light Source.

The future use of the facility is expected to be similar to its past and current use for energy related research. In accordance with changing research requirements, some facilities may be

decommissioned or converted for new missions. Because the land occupied by Lawrence Berkeley Laboratory is owned by the University of California, the installation will be cleaned to the standards required for unrestricted use. The total costs associated with the Lawrence Berkeley Laboratory are in the Estimated Site Total table. All funding is nondefense as shown in the Nondefense Funding Estimate table.

ENVIRONMENTAL RESTORATION

Laboratory operations at Lawrence Berkeley Laboratory generate low-level and low-level mixed radioactive waste. The types of hazardous waste handled at Lawrence Berkeley Laboratory include polychlorinated biphenyls, corrosive liquids, organic solvents, heavy metals, water-reactive chemicals, oxidizing agents, flammable liquids, strong acids, and asbestos. Mixed radioactive waste streams include lab-packed liquids and solids with acids, alkalines, reactives, oxidizers, organic liquids, induced lead and mercury waste, scintillation fluids, and contaminated debris. The costs associated with environmental restoration activities are found in the Environmental Restoration Projects table below. These costs are broken down by activity in the Environmental Restoration Project Activity Costs table on the following page.

Past practices resulted in radioactive and hazardous soil and ground-water contamination. Lawrence Berkeley Laboratory performs research in energy sciences, biosciences and general sciences. In performing this research many types of chemicals, some radioactive and some hazardous, have been used in the operations at these facilities, or in support shops, or have been produced as waste from these facilities. Contamination occurring at these research facilities as a result of past waste management practices were standard for the day, routine operations that caused emissions of materials, and limited leaks and spills of materials. The predominant contaminants identified to date are solvents in ground water. The potential contaminant sources identified to date are several sewer systems and aboveground and underground storage tanks. The current site-wide investigation is designed to determine the lateral and vertical extent of contamination at Lawrence Berkeley Laboratory by volatile organic compounds, metals, and tritium. The results of past investigations indicate the contamination is restricted to localized areas near the sources, but this has yet to be confirmed. To date, five plumes of contaminated ground water have been identified at Lawrence Berkeley Laboratory. These plumes include:

- solvent plumes south of Building 71, north of Building 7 (probably related to an abandoned sump), and east and south of Building 6;
- a tritium plume southeast of Building 75 (the National Tritium Labeling Facility); and
- a plume of petroleum hydrocarbons from the former location of an underground fuel tank south of Building 7.

The quantity and extent of potential soil and ground-water contamination have not been fully characterized, and a site-wide public health and environmental risk assessment has yet to be performed.

The principal environmental concerns at Lawrence Berkeley Laboratory involve soil and ground-water contamination from past operations. Corrective action measures initiated in compliance with a Regional Water Quality Control Board Order in October 1988, focused on contamination detected in a network of hydraugers. Lawrence Berkeley Laboratory was issued a Resource Conservation and Recovery Act (RCRA) Part B permit for hazardous waste storage on May 4, 1993. This permit indicated the corrective actions required

at Lawrence Berkeley Laboratory and is now the primary driver for the remedial actions. The California Department of Toxic Substances Control completed a RCRA facility assessment of Lawrence Berkeley Laboratory in November 1992 and required Lawrence Berkeley Laboratory to conduct RCRA facility investigations of several solid waste management units.

A RCRA facility investigation is ongoing to determine the source and extent of soil and ground-water contamination. The RCRA facility investigation is being conducted using a phased approach with all RCRA facility investigation tasks scheduled for completion in FY 1997. A RCRA corrective measures study will begin in FY 1996 and be completed in FY 1998. RCRA corrective measure designs will be finalized in FY 1999 and implemented in FY 2001.

RCRA closure of the existing Hazardous Waste Handling Facility is scheduled to commence in FY 1996 after the completion of the new Hazardous Waste Handling Facility. RCRA closure of the existing facility is scheduled for completion by FY 1998. The intention is a one-time final closure of the Hazardous Waste Handling Facility with no postclosure care required because all waste, equipment, structures, and contaminated soils will be removed.

The existing hazardous waste handling facility includes Buildings 75, 75A, and 69; the Corporation Yard; and the Building 77 coolant evaporator. It handles a variety of organic solvents, waste acids, oxidizers, corrosive liquids, waste oil, polychlorinated biphenyls, asbestos, metal sludge, mercury waste, waste coolant, and contaminated soils.

Contamination is considered to be restricted to the actual Hazardous Waste Handling Facility structures and the shallow surface soil in the immediate vicinity and is not expected to have impacted ground water. To reduce the health risk and expense of moving waste to the new Hazardous Waste Handling Facility, the remaining radioactive and mixed waste, estimated at 613 cubic meters, stored in the existing Hazardous Waste Handling Facility will be shipped to either the Hanford site or other DOE approved facilities in FY 1995. Closure of the hazardous waste handling facility will generate approximately 50 cubic

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	1,293	0	0	0	0	0	0	7,760
Remedial Actions	1,672	2,264	113	96	82	56	0	23,086
Total	2,965	2,264	113	96	82	56	0	30,846

Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

meters of low-level waste, 10 cubic meters in the form of concrete rubble, and 40 cubic meters of contaminated soil. Rinsate from the closure of the hazardous waste handling facility will generate approximately 870 drums or 181 cubic meters of wastewater. The hazardous waste from the Hazardous Waste Handling Facility closure will be disposed at offsite treatment, storage, and disposal facilities.

Several interim actions have been taken to prevent the migration of known contaminants at the site. These actions include extraction and treatment of ground water at three locations, treatment of effluent from the hydraugers near Building 51, and excavation of contaminated soils in source areas. Future cleanup strategies are yet to be developed but may include ground water and soil gas extraction and treatment, and soil removal. Storage and disposal requirements for environmental restoration generated waste are yet to be determined and will depend on the results of the RCRA facility investigations and corrective measure studies and the types of remediation selected.

WASTE MANAGEMENT

Waste management activities include the transport, limited treatment, storage, and disposal of hazardous, radioactive (including transuranic), and mixed radioactive waste. Current sources of this waste include normal laboratory operations and restoration interim actions. Future sources include environmental restoration generated waste from the closure of the existing Hazardous Waste Handling Facility and any remedial actions currently occurring in Buildings 75, 75A, and 69; the Corporation Yard; the Building 77 coolant evaporator; and adjacent storage yards (see the Major Waste Management Projects table for associated costs). These costs are presented by waste type in the Waste Management Activity Costs table of the Hazardous Waste Handling Facility. To facilitate the development of this life cycle cost estimate, an arbitrary cutoff date of 2030 has been assigned to all sites that have completed environmental restoration but maintain ongoing waste management support of other DOE programs (Energy Research, Defense Programs, etc.).

Lawrence Berkeley Laboratory operates under a RCRA Part B permit issued on May 4, 1993, to allow consolidation, neutralization, and solidification of mixed radioactive waste, and temporary storage of hazardous and radioactive waste prior to disposal. The existing hazardous waste handling facility is scheduled for RCRA closure by FY 1998. A replacement Hazardous Waste Handling Facility is under construction and planned for completion in FY 1996.

Key facility compliance actions concern air emissions and wastewater and sanitary sewer discharge. The Environmental Protection Agency (EPA) and DOE have negotiated a Federal Facility Compliance Agreement to bring Lawrence Berkeley Laboratory into full compliance with Federal and State laws governing air emissions by FY 1995.

Lawrence Berkeley Laboratory has an agreement in place with the East Bay Municipal Utility District regarding wastewater discharge compliance. Quarterly inspections and sampling are being conducted by the East Bay Municipal Utility District. By FY 1995, Lawrence Berkeley Laboratory expects to meet all requirements concerning its sanitary sewer permit.

Other near-term goals for waste management at Lawrence Berkeley Laboratory include the monitoring or removal of inadequate underground storage tanks in FY 1995, and the installation of deionization regeneration equipment in FY 1996. A further priority of the waste management activity at Lawrence Berkeley Laboratory is the waste minimization activity focusing on implementing recycling opportunities, toxicity reductions, materials substitution, and source process modifications.

Waste Treatment

There is an onsite neutralization unit at Lawrence Berkeley Laboratory permitted under Lawrence Berkeley Laboratory's existing Hazardous Waste Handling Facility RCRA Part B permit. The permit allows for the storage of mixed radioactive waste streams and treatment. Onsite treatment of Federal Facility Compliance Act mixed waste will consist of the neutralization of two low-level mixed waste streams estimated at slightly over 3 cubic meters including lab packed, flammable and nonflammable, acidic and alkaline solutions and solids with metals and radionuclides. These wastes will then be sent to DOE Hanford for disposal or treatment. Mixed radioactive waste will be sent to the Oak Ridge National Laboratory for chemical oxidation treatment. All other mixed waste will be sent to DOE Hanford for incineration, stabilization, and/or microencapsulation. The onsite amalgamation of liquid-induced mercury will be the subject of a treatability study.

Water pumped from the site hydraugers is currently treated with an activated carbon system with the treated water being used to replace cooling-tower water according to an agreement between Lawrence Berkeley Laboratory, the California State Water Resources Control Board, and the East Bay Municipal Utility District. Wastewater generated by Lawrence Berkeley Laboratory environmental cleanup activities will be disposed offsite at appropriate disposal facilities. No other treatment of hazardous waste occurs at the site, and none will occur in the future other than preprocessing or minimization to conform with waste storage and disposal requirements.

Waste Storage

Waste handled at Lawrence Berkeley Laboratory includes a wide range of chemicals originating from the many research and support facilities onsite. Storage of most hazardous waste is for less than 90 days. The RCRA Part B permit allows storage of some hazardous waste in designated areas for up to one year. Storage of low-level waste and low-level mixed waste also occurs prior to shipment to DOE Hanford.

Current annual generation estimates include 350,000 pounds of hazardous waste and approximately 36 cubic meters of low-level waste. The volume of low-level mixed waste stored as of mid 1994 was approximately 6 cubic meters. The projected generation of low-level mixed waste through 1997 is an additional 4 cubic meters. Also, the total volume of mixed waste potentially generated from environmental restoration activities is estimated at 1.6 cubic meters. Transuranic waste has been accumulating at Lawrence Berkeley Laboratory since the mid-1970's, but in 1993 the inventory

Major Waste Management Projects

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Hazardous Waste Handling Facility	333	0	0	0	0	0	0	2,000

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

consisted of fewer than ten 55-gallon drums. Storage of transuranic waste will continue pending the opening of a disposal facility (the Waste Isolation Pilot Plant).

The existing Hazardous Waste Handling Facility consists of several separate buildings, but Lawrence Berkeley Laboratory will consolidate all waste handling and monitoring activities at the improved Hazardous Waste Handling Facility when it is completed in FY 1996.

Waste Disposal

Hazardous wastes from Lawrence Berkeley Laboratory are disposed of at a variety of offsite permitted disposal, treatment, and recycling facilities. In 1992, Lawrence Berkeley Laboratory received authorization from the DOE Hanford Facility and the State of Washington to ship low-level and low-level mixed waste to DOE Hanford. The estimated amount of low-level waste to be disposed in FY 1995 and FY 1996 is 39 cubic meters for each year. This amount will increase to 59 cubic meters in FY 1997. Approximately three quarters of a cubic meter of mixed reactives waste will be sent to Oak Ridge National Laboratory for chemical oxidation treatment. Approximately 6.5 cubic meters of other mixed waste not treated onsite or sent to Oak Ridge will be sent to DOE Hanford for treatment, stabilization, and/or microencapsulation.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at Lawrence Berkeley Laboratory.

LANDLORD FUNCTIONS

The Office of Energy Research is the DOE landlord for Lawrence Berkeley Laboratory. The University of California owns the land and leases it to DOE. Key landlord activities include permitting and monitoring.

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-Level Mixed Waste	1,721	1,191	1,191	1,198	1,219	1,194	1,086	45,720
Low-Level Waste	1,038	718	718	718	718	718	587	27,125
Hazardous Waste	5,174	3,580	3,580	3,580	3,580	3,580	2,864	134,861
Total	7,934	5,489	5,489	5,496	5,517	5,492	4,538	207,706

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PROGRAM MANAGEMENT

Program management tasks supporting the environmental restoration at Lawrence Berkeley Laboratory include personnel management; maintenance of site-wide environmental data; strategic planning; financial management; interaction with DOE, external regulatory agencies, and the public; permitting; monitoring of project progress; provision of a technical advisory board; and administrative support. Associated costs are presented in the Program Management Cost Estimate table.

Program management tasks supporting the waste management at the Lawrence Berkeley Laboratory include facility management; personnel management and training; administrative support; document, guidance, and procedure preparation and revision; database and waste-tracking management; liaison with DOE and external regulatory agencies; audits; contractor oversight; budget preparation and control; and waste minimization planning.

DOE's Oakland Operations Office and the State of California have an Agreement-in-Principle providing for technical and financial support to the State for its activities at Lawrence Berkeley Laboratory and five other DOE sites in California. The support includes environmental oversight, monitoring, access, emergency preparedness, and other activities to ensure compliance with Federal, State, and local regulations applicable to the site.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	895	1,831	1,485	1,470	1,461	1,429	1,134	49,422

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Lawrence Berkeley Laboratory.

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	2,965	2,264	113	96	82	56	0	30,846
Waste Management	7,934	5,489	5,489	5,496	5,517	5,492	4,538	207,706
Program Management	895	1,831	1,485	1,470	1,461	1,429	1,134	49,422
Total	11,793	9,584	7,087	7,062	7,060	6,977	5,672	287,975

* *Costs raflact a five-year avarage in constant 1995 dollars, axcept in FY 1995-2000, which is a six-yeer everaga.*

** *Total Lifa Cycie is tha sum of annuel costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Site-Wide Assessment	2000
	RFI-Soil and Ground Water Report[1]	1997
	CMS-Soil and Ground Water Report[1]	1997
	Corrective Measures Final Design[2]	1999
	Site-Wide Remediation	2025
	Corrective Measures Implementation	2001
	RCRA Closure of Existing HWHF	
	Begin Closure	1996
	Complete Closure	1998
Waste Management		Fiscal Year
	Removal of Inadequate USTs	1995
	Full Compliance with NESHAPS	1995
	Installation of Deionization/Regeneration Equipment	1996
	New HWHF Construction	1996
	Site-Wide Hazardous Waste Management Complete	2030
	Treatment of Low-Level and Low-Level Mixed Waste Complete	2030

[1] *Completion dates are for submission of reports to regulatory authorities.*

[2] *Completion date is for submission to DOE HQ.*

CMS = Corrective Measure Study

HWHF = Hazardous Waste Handling Facility

NESHAPS = National Emission Standards and Hazardous Air Pollutants

RCRA = Resource Conservation and Recovery Act

RFI = RCRA Facility Investigation

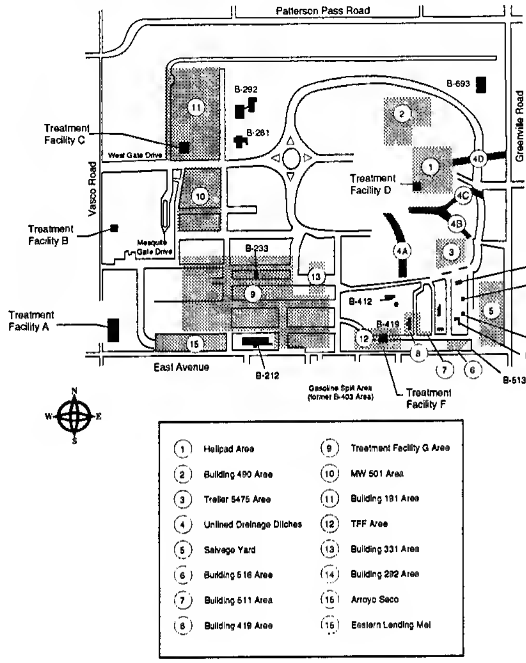
USTs = Underground Storage Tanks

For further information on this site, please contact: *Public Participation Office* *(510) 637-1812*
Public Affairs Office *(510) 486-5771*
Technical Liaison: Rich Fallejo *(510) 637-1639*

LAWRENCE LIVERMORE NATIONAL LABORATORY

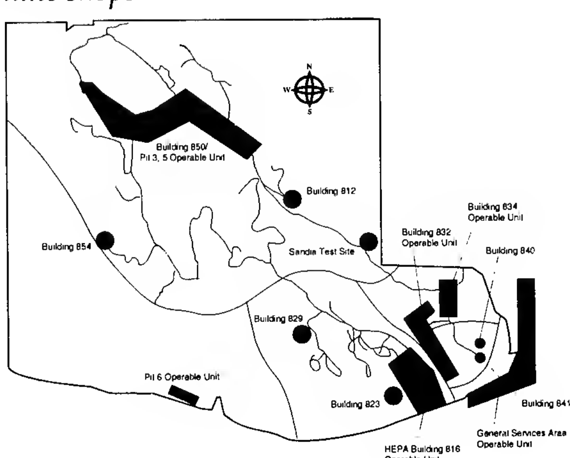
Main Site

The Main Site of the Lawrence Livermore National Laboratory occupies approximately one square mile in the Livermore-Amadore Valley on the eastern border of the City of Livermore, California. The site, which is also known as the Livermore site, is approximately 50 miles east of San Francisco and about one-half mile from the City of Livermore.



Site 300

Site 300 of the Lawrence Livermore National Laboratory is a remote high-explosives testing facility approximately 15 miles southeast of the Laboratory's Main Site and 10 miles southwest of the Town of Tracy, California. The site occupies 11 square miles (some 7000 acres) in Alameda and San Joaquin Counties. It hosts several areas for high-explosives processing and fabrication and testing, facilities for the thermal testing of high-explosives components, several instrumented firing tables for explosives testing, an advanced test-particle accelerator, and various general services facilities such as a motor-pool shop and machine shops.



Estimated Site Total

Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	20,935	21,143	26,430	26,903	27,895	28,679
Waste Management	44,710	61,368	47,217	49,577	52,049	50,132
Nuclear Material and Facility Stabilization	0	0	0	4,845	4,845	4,845
Program Management	5,065	5,849	5,887	6,206	6,979	7,107
Total	70,710	88,360	79,534	87,531	91,768	90,763

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	23,420	15,539	11,196	7,639	4,620	3,876	3,017
Waste Management	47,276	33,877	33,873	34,170	35,076	33,952	27,859
Nuclear Material and Facility Stabilization	4,506	1,979	0	0	0	0	0
Program Management	5,717	28,358	13,242	10,455	9,801	9,289	7,467
Total	80,919	79,753	58,311	52,264	49,497	47,118	38,343

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	2,231	1,387	1,185	1,012	519	0	0	401,623
Waste Management	3,174	430	2	0	0	0	0	1,295,718
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	36,929
Program Management	1,223	474	314	268	0	0	0	438,757
Total	6,628	2,291	1,500	1,280	519	0	0	2,173,027

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

Main Site

The Livermore Main Site was purchased by the U.S. Navy in 1942 and was initially used as a flight training base and engine overhaul facility. The transition from Navy operations to research began in 1950, when the Atomic Energy Commission authorized the construction of a materials-test accelerator at the site. The Commission established the University of California Radiation Laboratory, Livermore Site (the predecessor of the Lawrence Livermore National Laboratory) as a laboratory for nuclear weapons research.

The current mission of the Lawrence Livermore National Laboratory is research, testing, and development focusing on national defense and security, energy, the environment, and

biomedicine. The Laboratory's specific defense mission is the research, testing, and development of technologies related to nuclear weapons. The mission has been broadened over the years to meet national needs, such as the enhancement of economic competitiveness and science education. These missions are expected to continue for the foreseeable future.

Site 300

Site 300 was purchased from local ranchers in the 1950's. The surrounding area is agricultural and has an average population density of less than one person per square mile.

The site's former and current mission is the research and testing of nonnuclear high-explosive components for the Department of Energy's (DOE) nuclear weapons program.

The Department plans to continue using Site 300 for the testing of high-explosives components. Should these plans change in the future, institutional control over the site will be maintained by identifying another government mission for the site.

The Estimated Site Total table found on the previous page presents the total costs for both the Main Site and Site 300. These costs are presented by the defense and nondefense allocation in the Defense Funding Estimate and Nondefense Funding Estimate tables.

ENVIRONMENTAL RESTORATION

Main Site

Past operations involving the handling and storage of hazardous materials at the Laboratory's Main Site resulted in the release and subsequent migration of contaminants into soil and ground water. Nineteen different source areas have been identified in various parts of the site. The Main Site was placed on

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Decommissioning	0	608	1,317	1,013	1,013	1,013	1,013
Main Site Restoration	13,151	8,172	5,828	4,231	2,991	2,224	1,900
Site 300 Restoration	10,269	6,759	4,051	2,395	616	639	104
Total	23,420	15,539	11,196	7,639	4,620	3,876	3,017

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Decommissioning	608	0	0	0	0	0	0	32,929
Main Site Restoration	1,623	1,387	1,185	1,012	519	0	0	234,258
Site 300 Restoration	0	0	0	0	0	0	0	134,436
Total	2,231	1,387	1,185	1,012	519	0	0	401,623

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

the National Priorities List of the Environmental Protection Agency (EPA) in 1987. Costs for environmental restoration activities at the Main Site are presented in the Environmental Restoration Projects table on the following page. These costs are broken down by activity in the Environmental Restoration Project Activity Costs table.

The major contaminants in soil and ground water are volatile organic compounds and fuel hydrocarbons. Subsequently, chlorinated hydrocarbons have been detected in ground water at concentrations of up to 10 parts per million.

A further source of ground-water contamination is an underground fuel-storage tank that released approximately 17,000 gallons of leaded gasoline between 1961 and 1979. Tritium has also been detected in an onsite monitoring well at concentrations above the drinking water standards. To date, only one source of tritium, a 1991 leak from a tank at Building 292, has been identified. Ongoing investigations are focused on profiling all remaining sources of ground-water contamination.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Facility Decommissioning							
Facility Decommissioning	0	608	1,317	1,013	1,013	1,013	1,013
Main Site Restoration							
Remedial Actions	13,151	8,172	5,828	4,231	2,991	2,224	1,900
Site 300 Restoration							
Assessment	3,208	0	0	0	0	0	0
Remedial Actions	5,718	6,116	3,083	1,686	399	341	0
Surveillance And Maintenance	56	642	968	710	217	298	104
Facility Decommissioning	1,287	0	0	0	0	0	0
Total	23,420	15,539	11,196	7,639	4,620	3,876	3,017

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Facility Decommissioning								
Facility Decommissioning	608	0	0	0	0	0	0	32,929
Main Site Restoration								
Remedial Actions	1,623	1,387	1,185	1,012	519	0	0	234,258
Site 300 Restoration								
Assessment	0	0	0	0	0	0	0	19,250
Remedial Actions	0	0	0	0	0	0	0	92,428
Surveillance And Maintenance	0	0	0	0	0	0	0	15,038
Facility Decommissioning	0	0	0	0	0	0	0	7,720
Total	2,231	1,387	1,185	1,012	519	0	0	401,623

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

The primary ground-water contamination at the Main Site is a 1.4-square-mile plume, consisting mainly of trichloroethene threatening private wells and the water wells of the nearby City of Livermore. Private wells threatened by the plume have been closed and their users were provided with an alternative water supply. The trichloroethene plume is not expected to affect the municipal wells for the next 70 years, while the planned remediation to reduce the concentrations of contaminants to acceptable levels is expected to take only slightly more than 50 years.

Decommissioning activities are planned for five buildings currently listed in the Nuclear Material and Facility Stabilization Surplus Facilities Inventory. These facilities include the Chemistry Building (#212), the Reactor Dome Building (#281), the Envir onmental Laboratory Building (#412), the Chemistry laboratory Facility (#212) and the Heavy Element Building (#251). Operations at these facilities include chemistry and material science laboratory analysis, analytical laboratory operations, and multifunction research laboratory analysis. Some of these operations included working with nuclear material. As a result, decommissioning activities will include the cleanup and disposal of radioactive and hazardous materials including asbestos. The decommissioning effort will include all planning characterization, decontamination, demolition, and disposal of all building materials such that the resultant vacant sites can be landscaped for soil retention. DOE has negotiated agreements with the EPA and the State of California for cleaning up the site on the basis the site will continue to be used by DOE for research and development.

Currently, DOE is using new pump-and-treat methods to remediate ground water at five treatment units, and further migration of the plume of contaminated ground water is being contained by means of onsite extraction wells. In fiscal year 1993, more than 73 million gallons of ground water was extracted and treated to remove organic solvents, and more than 10,000 gallons of gasoline was recovered. Ground-water treatment plans have been proposed to reduce the concentrations of solvents, gasoline, and other contaminants to levels below those specified in drinking-water standards.

Tritium in ground water will be allowed to decay naturally in place. Wastes contaminated with volatile organic compounds generated by remedial actions are placed in granular-activated carbon canisters and removed to offsite treatment facilities.

Site 300

Past operations involving the processing, testing, and deactivation of explosive materials resulted in soil and ground-water contamination at the site. The sources of contamination included leaking pipes, disposal sites (landfills, debris piles, drywells, and evaporation ponds), and spills. The contaminants include high-explosive compounds, including beryllium, lead, and uranium; halogenated hydrocarbons (mainly trichloroethene and perchloroethene); and tritium. In 1990, Site 300 was placed on the EPA's National Priorities List primarily because several plumes of volatile organic compounds had been detected in ground water offsite. Costs for environmental restoration activities at Site 300 are presented in the Environmental Restoration Projects table. These costs are broken down by activity in the Environmental Restoration Project Activity Costs table.

All major ground-water plumes have since been delineated. The major area of concern at Site 300 is the General Services Area, a support area with machine shops, administrative offices, motor-pool facilities, and other support facilities. At several locations in this area, solvents were discharged into drywells or the ground. These practices, long discontinued, resulted in soil and ground-water contamination. Trichloroethene plumes have reached the shallow alluvial aquifer in the

Corral Hollow Basin and into the regional aquifer at the GSA area. The contaminated ground water threatens two water-supply wells monitored regularly. DOE has made a formal agreement with their users to provide alternative water supplies. Upon securing the alternative water supplies, the original wells will be deactivated and converted into monitoring wells. At present, the levels of contamination in ground water and soil do not pose health risks to site workers. In the area where high explosives are processed, low concentrations of volatile organic compounds and high explosives are present in soil and perched water-bearing zones.

A thermal testing facility in Building 834 has been operating since 1957. Before 1994, this facility used trichloroethene as its heat transfer fluid. In the 1950's, 1960's, and 1970's, trichloroethene was released into the ground through pipe leaks and spills. In the 1980's, the facility piping and solvent storage areas were upgraded to prevent further releases. Information about operations and data from site characterization indicate up to 550 gallons of trichloroethene was released in the area of Building 834. Most of this material is still present in the soil and ground water.

The ground water at Building 834 is perched on a lens of clay that, together with another clay lens and 280 feet of unsaturated sediments, physically separates it from the regional aquifer. The perched ground water has no pathway away from the site, and therefore the site poses no risk to the public. Contaminant concentrations in soil and ground water are very high at Building 834, and it is believed pockets of free product trichloroethene (dense nonaqueous phase liquid) are present. DOE plans to use the Building 834 area to test volatile organic compounds and dense nonaqueous phase liquid cleanup technologies.

Located in the ground water of Pits 3 and 5 and the Building 850 area, a low-level tritium plume is emanating from Pits 3 and 5 at the closed landfill and from the Building 850 firing table. The tritium plume is entirely onsite, and fate and transport calculations indicate tritium concentrations offsite are well below both Federal and State drinking water standards. In addition, polychlorinated biphenyls (PBCs), volatile organic compounds, and depleted uranium have been detected in the operable unit. The extent of PBCs and uranium contamination in soil and volatile organic compound contamination in ground water in this area is still being investigated.

At Pit 6, volatile organic compounds from the closed landfill have contaminated the uppermost aquifer; however, ground water from this unit flows to the surface approximately 500 feet west of the landfill on DOE land where the contaminants slowly evaporate. The concentrations of volatile organic compounds in the ground water have dropped significantly since 1987.

Several facilities not discussed above, such as the Building 832 Canyon, have been identified as sites where hazardous spills, leaks, or discharges may have occurred. Although these facilities do not pose current health or environmental risks, they could require remediation in the future.

It is assumed future use of Site 300 will continue to include the diverse types of research operations currently being conducted and the site will remain a Federal facility. No buildings are slated for decommissioning activities, and no future residential use is anticipated.

The environmental restoration at Site 300 focuses on the assessment and remediation of releases of solvents, tritium, and high-explosive components from landfills, drywells, spills, leaks, and other sources at the site. Particular attention centers on:

- weapons component testing areas and solvent releases from Buildings 833 and 834,

- solvent releases from debris piles and drywells at the southeast General Services Area,
- solvent and high-explosive component releases from the High-Explosive Process Area,
- tritium releases from the Building 850 firing table and the Pit 7 landfill complex, and
- solvent releases from the Pit 6 landfill.

In 1991, the treatment of trichloroethene contaminated ground water began at the eastern General Services Area. The eastern General Services Area plume extends offsite and down the Corral Hollow alluvial channel for approximately 1 mile. By the end of fiscal year 1993, 12.8 million gallons of contaminated ground water had been treated and discharged to an ephemeral stream. At the central General Services Area, ground water from a shallow alluvial aquifer is being remediated for trichloroethene contamination with both pump-and-treat and soil-vapor-extraction systems.

Resource Conservation and Recovery Act (RCRA) closure of the High Explosive Burn Pits will begin once the new explosive waste treatment facility is operational, currently scheduled for the end of fiscal year 1997. Closure of the High Explosive Burn Pits will be followed by postclosure monitoring.

Following technology testing, Building 834 will be remediated to risk-based standards. DOE is pursuing an exemption for this activity from the Central Valley Regional Water Quality Control Board Basin Plan. It is assumed the Central Valley Regional Water Quality Control Board will not require Environmental Management's environmental restoration activity to perform solid waste assessment tests of the Site 300 landfills.

WASTE MANAGEMENT

The Waste Management Projects table contains costs for all waste management activities at the Main Site and Site 300. For costs allocated by waste type see the Waste Management Activity Costs table.

Main Site

Waste management activities at the Laboratory's Main Site include the treatment, storage, and offsite disposal of chemically hazardous waste, low-level radioactive waste, mixed hazardous and low-level radioactive waste, transuranic waste, and mixed

Major Waste Management Projects

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Decontamination and Waste Facility	10,333	1,000	0	0	0	0	0	67,000
Mixed Waste Management Facility	11,500	0	0	0	0	0	0	69,000

* Costs reflect e five-yeer averege in constent 1995 dollars, except in FY 1995-2000, which is e six-year average.

** Totel Life Cycle is the sum of ennuel costs in constant 1995 dollars.

Note: These projects represent e subset of Weste Menegement ectivities. Associeted progrem menegement costs ere built-in to the estimate provided.

transuranic waste. The waste management facilities at the Main Site are operated under an interim permit under the RCRA Part A pending the approval of a RCRA Part B permit application.

The generation of some types of waste at the Main Site is expected to be significantly decreased in the near future. For example, the generation of hazardous waste solids are projected to decrease from 311,849 pounds and 149 cubic meters in 1994 to 261,677 pounds and 140 cubic meters by the year 2000, and the generation of liquid mixed waste is projected to decrease from 5,699 gallons in 1994 to 3,902 gallons by 2000. These reductions are primarily the result of waste minimization efforts. However, the generation of solid low-level radioactive waste is expected to increase from 254,976 pounds in 1994 to 319,527 pounds by 2000.

Waste Treatment

Waste treatment at the Laboratory's Main Site is limited to liquid hazardous waste, low-level radioactive waste, and low-level mixed waste. It consists of filtration and the precipitation of

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Transuranic Waste	2,347	1,716	1,716	1,716	1,716	1,716	1,430
Low-Level Mixed Waste	5,961	4,358	4,358	4,655	5,569	4,445	3,644
Low-level Waste	2,467	1,804	1,804	1,804	1,804	1,804	1,495
Storage and Handling							
Transuranic Waste	5,775	3,563	3,563	3,563	3,563	3,563	3,350
Low-Level Mixed Waste	15	10	9	8	0	0	0
Low-level Waste	4	1	1	1	1	1	1
Hazardous Waste	30,684	22,424	22,421	22,423	22,423	22,423	17,939
Sanitary Waste	23	0	0	0	0	0	0
Total	47,276	33,877	33,873	34,170	35,076	33,952	27,859

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Transuranic Waste	230	0	0	0	0	0	0	65,283
Low-Level Mixed Waste	632	0	0	0	0	0	0	174,070
Low-level Waste	206	0	0	0	0	0	0	68,402
Storage and Handling								
Transuranic Waste	2,103	428	0	0	0	0	0	153,136
Low-Level Mixed Waste	0	0	0	0	0	0	0	228
Low-level Waste	1	2	2	0	0	0	0	90
Hazardous Waste	2	0	0	0	0	0	0	834,372
Sanitary Waste	0	0	0	0	0	0	0	137
Total	3,174	430	2	0	0	0	0	1,295,718

* *Costs reflect e fiva-yeer everega in constent 1995 dollars, except in FY 1995-2000, which is a six-year everaga.*

** *Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

metals and radioactive constituents. Various waste management facilities are available in several of the buildings and building complexes at the site. They include shredders and size reduction units for low-level radioactive and low-level mixed waste; equipment for solidifying liquid hazardous, low-level radioactive, and low-level mixed waste; a wastewater filtration unit for various types of wastes; a silver recovery unit; and a wastewater treatment tank farm. In addition, a transportable treatment unit for metals recovery is available. After chemical analysis to confirm it meets discharge standards, wastewater is discharged to the local sanitary sewer.

In 1992, the Laboratory began a project to design and construct a pilot-scale treatment system for low-level mixed radioactive and organic waste without incineration. This project will provide engineering and design information for the deployment of full-scale treatment capabilities at other DOE sites. The pilot plant will be used to test treatment technologies at least through fiscal year 2000.

Waste Storage

The Laboratory operates licensed waste-storage facilities. These facilities, located in various buildings, serve both the Main Site and Site 300. They include container storage units; areas for storing hazardous, low-level radioactive, low-level mixed radioactive waste, or transuranic waste; a storage tank farm for hazardous, low-level, and low-level mixed waste; and portable tank and tank trailer storage facilities. Estimates of practical storage capacity at the various units are 850 cubic meters for hazardous waste, 1,606 cubic meters for low-level waste, 1,695 cubic meters for low-level mixed waste, and 1,059 cubic meters for transuranic waste.

Waste Disposal

No waste is disposed at the Lawrence Livermore National Laboratory. Low-level solid radioactive waste is sent to the Nevada Test Site for disposal. Low-Level Mixed Waste is stored at the Main Site until a disposal site or sites is selected; the disposal site may be the Department's facilities at Hanford or a licensed commercial site. Hazardous waste is sent to licensed offsite disposal facilities. Transuranic waste will be kept in storage until the Waste Isolation Pilot Plant in New Mexico is available.

Site 300

Waste generated at Site 300 includes explosive waste from testing activities, waste from various other operations, and environmental restoration generated waste. The Waste Management department of Lawrence Livermore National Laboratory operates a permitted treatment, storage, and disposal facility at Building 883 at Site 300 and an interim status explosives treatment facility at the High-Explosive Burn Pits. The focus of waste management at Site 300 is the storage, treatment, and disposal of hazardous, mixed, aqueous, and low-level radioactive waste at both facilities.

The Waste Minimization Project is also a waste management facility at Site 300 and aims to reduce the amounts and toxicity of hazardous, radioactive, mixed, and nonhazardous waste. Waste management activities at Site 300 also include the confirmatory gravel sampling and analysis plan. This plan addresses the characterization of newly generated debris from firing table operations.

Waste Treatment

Currently, the only treatment of waste conducted at Site 300 is the burning of explosive waste at the High Explosive Burn Pits. The burning of explosive waste at the High Explosive Burn Pits will cease when the

new Explosive Waste Treatment Facility is completed. A RCRA Part B application has been submitted for the Explosive Waste Treatment Facility, and construction of this new facility is scheduled to be completed by the end of FY 1997. Residual waste from the High Explosive Burn Pits are either transferred to waste management units at the Lawrence Livermore National Laboratory Main Site or disposed offsite at permitted treatment, storage, and disposal facilities. Some onsite treatment of restoration waste is performed at Site 300 including in situ vapor extraction treatment of vadose-zone volatile organic compound contaminated soils and aboveground pumping and treating of volatile organic compound contaminated ground water.

Waste Storage

Building 883 is the only permitted storage unit at Site 300. Building 883 has a RCRA Part B permit for the storage of explosives waste prior to treatment. Explosives waste is currently treated at the High Explosive Burn Pits and will be treated in the future at the new Explosive Waste Treatment Facility. There are also several waste accumulation areas at Site 300 where waste is stored for less than 90 days. Waste accumulated at Site 300 is either disposed offsite at permitted facilities or transferred to the various waste management facilities at the Lawrence Livermore National Laboratory Main Site.

Waste Disposal

No waste is currently disposed at Site 300 or the Lawrence Livermore National Laboratory Main Site. Lawrence Livermore National Laboratory low-level waste solids are disposed at the Nevada Test Site. Federal Facility Compliance Act mixed waste is currently stored at Lawrence Livermore National Laboratory Main Site pending determination of ultimate disposal. Hazardous waste is disposed offsite at permitted treatment, storage, and disposal facilities. Construction of the proposed Mixed Waste Management Facility at the Main Site may reduce the amount of offsite disposal from Lawrence Livermore National Laboratory.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The Lawrence Livermore National Laboratory has not yet entered the Environmental Management facility stabilization process, but it is assumed for purposes of this report it will do so in 1998. The facilities at the Lawrence Livermore National Laboratory anticipated to enter the program include a chemistry building, a heavy element facility, and a reactor dome. The resulting waste types will include low-level mixed, transuranic, low-level, and hazardous. This report assumes that the stabilization and maintenance process at the Lawrence

Nuclear Material and Faciity Stabilization Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	4,506	1,979	0	0	0	0	0	36,929

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Livermore National Laboratory will be completed by 2007. See the Nuclear Material and Facility Stabilization Projects table for associated costs.

LANDLORD FUNCTIONS

DOE's Office of Defense Programs conducts most of the research and development at Lawrence Livermore National Laboratory and is responsible for landlord functions at Main Site and Site 300.

PROGRAM MANAGEMENT

Main Site/Site 300

Program Management tasks supporting the environmental restoration activity at Lawrence Livermore National Laboratory Main Site and Site 300 include personnel management, strategic planning, financial management, interaction with DOE and external regulatory agencies, monitoring of project progress, and administrative support. The total cost for program management activities are presented in the Program Management Cost Estimate table.

Program management tasks supporting waste management activities at Lawrence Livermore National Laboratory Main Site and Site 300 include facility management; personnel management and training; administrative support; document, guidance, and procedure preparation and revision; data base and waste tracking management; liaison with DOE and external regulatory agencies; inspections and audits; budget preparation and control; and waste minimization planning. Waste minimization planning includes evaluation, training, and implementation of the following programs:

- recycling;
- substitution of less hazardous or nonhazardous raw materials;
- volume and/or toxicity reductions; and
- source process modifications.

Program Management

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	5,717	28,358	13,242	10,455	9,801	9,289	7,467

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Program Management	1,223	474	314	268	0	0	0	438,757

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

The Waste Minimization program is regulated by the California Hazardous Waste Source Reduction and Management Review Act.

DOE and the State of California have an Agreement-in-Principle providing for technical and financial support to the State for its activities at Lawrence Livermore National Laboratory Main Site and the Site 300. Technical and financial support includes environmental oversight, monitoring, access, emergency preparedness, and other initiatives to ensure compliance with applicable Federal, State, and local regulations.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Lawrence Livermore National Laboratory.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	23,420	15,539	11,196	7,639	4,620	3,876	3,017
Waste Management	47,276	33,877	33,873	34,170	35,076	33,952	27,859
Nuclear Material and Facility Stabilization	4,506	1,592	0	0	0	0	0
Program Management	5,717	28,358	13,242	10,455	9,801	9,289	7,467
Total	80,919	79,366	58,311	52,264	49,497	47,118	38,343

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	2,231	1,387	1,185	1,012	519	0	0	401,623
Waste Management	3,174	430	2	0	0	0	0	1,295,718
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	34,992
Program Management	1,223	474	314	268	0	0	0	438,757
Total	6,628	2,291	1,500	1,280	519	0	0	2,171,091

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	0	387	0	0	0	0	0	1,937

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

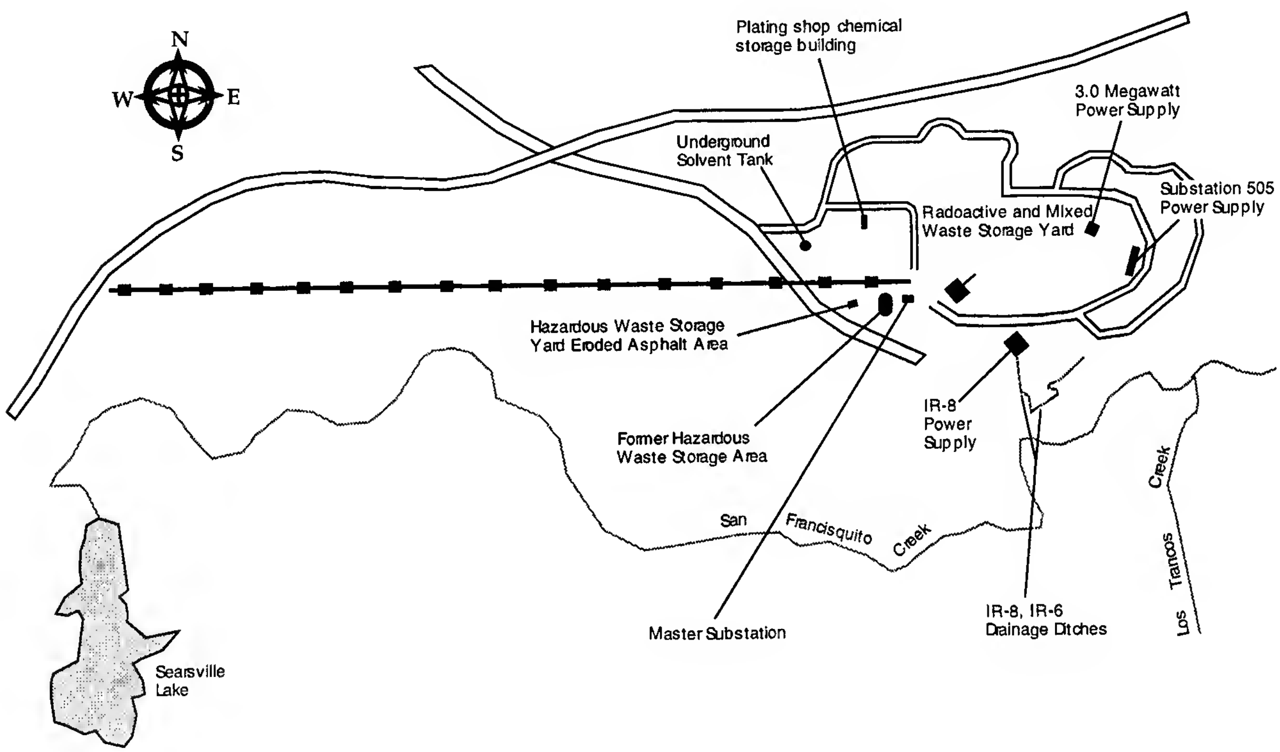
ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Begin Operation of B518 Vapor Extraction System - Main Site	1995
	Begin Operation of Treatment Facility G1 - Main Site	1996
	Issue Compliance Monitoring Plan - Main Site	1996
	Issue Contingency Plan - Main Site	1997
	RCRA High-Explosive Burn Pit Closure - Site 300	1998
	Submit Final OU No. 2 Record of Decision (ROD) to Regulatory Agencies - Site 300	1996
	Submit Final OU No. 1, No. 3, No. 4, and No. 5 RODs to Regulatory Agencies - Site 300	1997
	Submit Final OU No. 6 ROD to Regulatory Agencies - Site 300	1998
	Begin Operation of Trailer 5475 Water Treatment Facility - Main Site	1998
	Initiate OU No. 1 and OU No. 3 Final Remedies - Site 300	1998
	Initiate OU No. 2 Final Remedy - Site 300	1997
	Initiate OU No. 4 Final Remedy - Site 300	1999
	Issue Remedial Design #4 - Main Site	1997
	Begin Operation of Trailer 5475 Vapor Treatment Facility - Main Site	1999
	Begin Operation of TFG-2	1999
	Begin Operation of TFE	1999
Nuclear Material and Facility Stabilization		Fiscal Year
	Complete Facility Stabilization and Maintenance Activities	2007
Waste Management		Fiscal Year
	Construction of the Explosive Waste Treatment Facility	1997
	Completion of Pilot Test Treatment of the Mixed Waste Management Facility	2000

For further information on this site, please contact:

Public Participation Office (510) 637-1812
Public Affairs Office (510) 422-6900
Technical Liaison: Rich Fallejo (510) 637-1639

STANFORD LINEAR ACCELERATOR CENTER

The 426-acre Stanford Linear Accelerator Center is a high energy research facility owned and operated by Stanford University under contract to the Department of Energy (DOE). The site is located on the San Francisco Peninsula between San Francisco and San Jose, California.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	968	883	1,001	1,208	1,236	1,285
Waste Management	5,089	4,998	5,097	5,199	5,302	5,409
Program Management	202	226	272	285	299	315
Total	6,259	6,107	6,370	6,692	6,837	7,009

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Environmental Restoration	1,013	327	119	96	82	70	50	
Waste Management	4,813	3,507	3,507	3,507	3,507	3,507	2,821	
Program Management	246	977	925	918	912	907	732	
Total	6,073	4,811	4,551	4,520	4,500	4,483	3,604	
	FY 2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle*****
Environmental Restoration	13	0	0	0	0	0	0	9,868
Waste Management	64	0	0	0	0	0	0	130,971
Program Management	16	0	0	0	0	0	0	28,406
Total	92	0	0	0	0	0	0	169,244

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The Stanford Linear Accelerator Center was established in 1962 as a research facility for high energy particle physics. The Center's four major experimental facilities are the Linear Accelerator, the Positron Electron Project Storage Ring, the Stanford Positron Electron Asymmetric Ring, and the Stanford Linear Accelerator Center Linear Collider.

The Stanford Linear Accelerator's current mission as a center of research and development using high energy accelerators and experimental apparatus is assumed not to change for the time period of this estimate. With no change in mission, the future use of the site will be consistent with current activities. However, because Stanford University owns the facility land, should facilities be decommissioned they will be cleaned to the standards required for unrestricted use. The Office of Energy Research is the DOE landlord at the Stanford Linear Accelerator Center. Cost estimates are in Stanford Linear Accelerator Center Estimated Site Total table.

ENVIRONMENTAL RESTORATION

The Stanford Linear Accelerator Center generates mainly hazardous waste and small amounts of radioactive and mixed waste. The hazardous waste streams include:

- waste oils from machine shops, motor pools, pumps, and compressors;
- waste solvents from various degreasers, assembly shops, and "clean" operations;
- oils contaminated with polychlorinated biphenyls and PCB's;
- wastewater from the plating shop and its associated wastewater treatment facility;
- aqueous liquids with metals from metal-cleaning activities; and
- soil, clothing, and asphalt from the cleanup of spills and leaks.

A small amount of radioactive waste arises from the accumulation of corrosion products such as induced-radioactivity-containing copper in cooling water, resin-bed filters, and pipe and other metal pieces from the accelerator. A limited amount of low-level mixed waste could be generated when hazardous substances such as solvents are used to clean activated material or when oil in vacuum pumps serving the accelerator are irradiated by beam particles.

Past waste management practices and facility operations have resulted in the contamination of soils by polychlorinated biphenyls, petroleum hydrocarbons, lead, and other metals and the contamination of ground water by volatile organic compounds. The known sources of ground water contamination are a former leaking underground storage tank, the plating shop, and a former hazardous waste storage yard. The

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration							
Assessment	556	108	0	0	0	0	0
Remedial Actions	457	108	0	0	0	0	0
Surveillance And Maintenance	0	111	119	96	82	70	50
Total	1,013	327	119	96	82	70	50

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration								
Assessment	0	0	0	0	0	0	0	3,878
Remedial Actions	0	0	0	0	0	0	0	3,285
Surveillance And Maintenance	13	0	0	0	0	0	0	2,704
Total	13	0	0	0	0	0	0	9,868

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

known sources of soil contamination are Interaction Regions (IR) 6 and 8 drainage ditches, the 3.0-megawatt Power Supply, the Interaction Region 8 Power Supply, the Master Substation inactive area, and the Substation 505 Power Supply. Forty discrete areas of contamination have been identified to date.

Soil contamination has been found both on and offsite. To date, ground-water contamination has only been found onsite. The extent of soil and ground-water contamination is not completely defined. Potential site risks will be assessed once site characterization is complete.

A preliminary assessment completed in 1993 identified approximately 40 discrete areas of contamination requiring some degree of remedial action. The Environmental Restoration Projects table provides the total cost for environmental restoration activities at the Stanford Linear Accelerator Center. These costs are broken down by activity in the Environmental Restoration Project Activity Costs table. Environmental restoration activities compose a significant portion of the total nondefense funding as shown in the Nondefense Funding Cost Estimate table. Because of the large number of sites, the Stanford Linear Accelerator Center has chosen a site-wide approach to the remedial investigation that will integrate soil and ground-water concerns at all sites, replacing the individual sampling and analysis activities that have occurred to date at previously identified "high-priority" sites. Soil and ground-water interim actions are scheduled to commence in FY 1995, depending upon funding. In addition, ground-water monitoring will continue at the site of a former leaking underground storage tank, and a ground-water peripheral monitoring network will be completed between FY 1996 and FY 1999.

The remedial investigation reports on contaminated soil and ground water are scheduled for completion in FY 1998. The site-wide feasibility study is scheduled for completion in FY 1999. The site-wide record of decision is scheduled to be completed by FY 2000. Stanford Linear Accelerator Center has defined four sites requiring Interim Removal Actions by FY 2001. These sites include Interaction Region 8 Drainage Channel, Substation 505, Plating Shop, and lower Salvage Yard. The work performed at each site will include excavation of contaminated soil and confirmation sample collection and analysis to ensure cleanup standards have been met. Remediation of the Stanford Linear Accelerator Center site based on the record of decision will be required in the outyears beyond FY 2000. At this time this remediation effort has not been planned. Current estimates of contaminated media requiring treatment or disposal are 1,337 cubic meters of volatile organic compound contaminated ground water, 628 cubic meters of polychlorinated biphenyl contaminated soil, and 925 cubic meters of polychlorinated biphenyl and lead contaminated soil.

WASTE MANAGEMENT

Hazardous waste is generated by operations such as vehicle, equipment and general facility maintenance, and the operations of the plating shop and its associated waste treatment plant. Approximately 350 tons of hazardous waste are generated annually. Other waste streams are more variable, and the volume generated depends on the level of activity in the high energy research program. Restoration interim actions are expected to generate waste starting in FY 1995.

Radioactive waste includes low-level and low-level mixed waste generated through a variety of means:

- activation due to proximity to the beam line (largest volume),
- sealed sources and standards no longer in use,

- resin beds used in water recirculation, and
- solvents contaminated by their use in fabrication.

Approximately 84 cubic meters of low-level waste and 1 cubic meter of low-level mixed waste are expected to be generated annually at the Stanford Linear Accelerator Center.

Other scheduled waste management projects include the installation of an oil/water separator and the waste minimization program. A new oil/water separator at Interaction Region 8 is scheduled for completion by early FY 1995. The waste minimization program focuses on implementing recycling opportunities, toxicity reductions, materials substitution, and source process modifications.

The Stanford Linear Accelerator Center has operating permits and contracts with the South Bay System Authority and the West Bay Sanitary District (sanitary sewer limits and pretreatment standards), the Bay Area Air Quality Management District (operating permits for air sources and pollution devices), the Regional Water Quality Control Board (National Pollution Discharge Elimination System Permit and Waste Water Discharge Permit), and the San Mateo County Office of Environmental Health Resource Conservation Recovery Act (RCRA) generator permit. The costs for waste management activities at the Stanford Linear Accelerator Center are provide below.

Waste Storage

The four major storage areas for hazardous and radioactive waste currently onsite include the Chemical Storage Area, the Polychlorinated Biphenyl Storage Area, the Radioactive Material Storage Yard, and Building 660 at Interaction Region 6. Specific waste accumulation sites are located throughout the facility. The small amount of radioactive waste generated by the Stanford Linear Accelerator Center is stored in the fenced and bermed radioactive material storage yard while awaiting disposal at a DOE

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Low-level Waste	1,260	918	918	918	918	918	750
Hazardous Waste	3,554	2,589	2,589	2,589	2,589	2,589	2,071
Total	4,813	3,507	3,507	3,507	3,507	3,507	2,821

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Low-level Waste	64	0	0	0	0	0	0	34,574
Hazardous Waste	0	0	0	0	0	0	0	96,396
Total	64	0	0	0	0	0	0	130,971

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

approved facility. When experiments are completed, accelerator components and commercially procured radioactive materials are either recycled or stored pending disposal.

Approximately 15 percent of all radioactive material is declared waste by the Center. The new Radioactive and Mixed Waste Storage Facility is scheduled to be completed in FY 1995. The Radioactive Material Storage Yard will then be used solely as a staging area to receive, segregate, and process material and to store recyclable radioactive material. Interaction Region 6 is also used to store recyclable radioactive material. The separate Radioactive and Mixed Waste Storage Facility will be used exclusively for nonrecyclable radioactive and mixed waste storage prior to treatment or disposal offsite.

The Stanford Linear Accelerator Center currently has about one cubic meter of low-level mixed waste in storage and coordinates staging and ultimate disposal of land disposal restricted mixed waste with DOE Hanford.

Waste Disposal

The Stanford Linear Accelerator Center does not dispose of any hazardous, radioactive, or mixed waste onsite. Hazardous waste is manifested and sent offsite to permitted treatment, storage, and disposal facilities for treatment, disposal, or recycling. Some radioactive material is recycled at the Center, and some is sent to non-Center recyclers.

Radioactive and mixed waste is shipped to Hanford for treatment and disposal or to other approved DOE facilities. Current estimates for annual disposal are 350 tons of hazardous waste, 84 cubic meters of low-level radioactive waste, and 1 cubic meter of low-level mixed waste. Future volumes will depend on the level of research activity.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Stanford Linear Accelerator Center.

LANDLORD FUNCTIONS

The Office of Energy Research is the DOE landlord at the Stanford Linear Accelerator Center while Stanford University owns the facility land. It is expected that DOE's Energy Research program will continue to be the landlord and current operations will continue at the Stanford Linear Accelerator Center for the foreseeable future. The Environmental Management program is not expected to take on significant increased landlord responsibilities.

PROGRAM MANAGEMENT

The Program Management Cost Estimate table provides costs for both Environmental Restoration and Waste Management activities. Program management tasks supporting the environmental restoration activity at the Stanford Linear Accelerator Center include:

- personnel management;
- strategic planning;
- maintenance of site-wide environmental data;
- financial management;
- interaction with DOE, external regulatory agencies, and the public;
- permitting;
- monitoring of project progress and auditing; and

- administrative support.

Program management tasks supporting waste management activities at the Center include:

- facility management;
- personnel management and training;
- administrative support;
- spill control support;
- document, guidance, and procedure preparation and revision;
- database and waste-tracking management;
- audits of treatment, storage, and disposal facilities that receive hazardous waste from the Center;
- payment of disposal and inspection fees;
- budget preparation and control; and
- waste minimization planning.

DOE and the State of California have an Agreement-in-Principle providing for technical and financial support to the State for its activities in environmental oversight, monitoring access, facility emergency preparedness, and initiatives to ensure compliance with applicable Federal, State, and local laws at the Center and five other DOE facilities in California.

The Stanford Linear Accelerator Center currently has a compliance order from the California Regional Water Quality Control Board for monitoring ground water at the site and for the characterization and remediation of a former tank site.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Stanford Linear Accelerator Center.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	246	977	925	918	912	907	732

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Program Management	16	0	0	0	0	0	0	28,406

* *Costs reflect e five-yeer everage in constent 1995 dollars, excapt in FY 1995-2000, which is a six-year avarege.*

** *Total Lifa Cycla is tha sum of annual costs in constant 1995 dollers.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	1,013	327	119	96	82	70	50
Waste Management	4,813	3,507	3,507	3,507	3,507	3,507	2,821
Program Management	246	977	925	918	912	907	732
Total	6,073	4,811	4,551	4,520	4,500	4,483	3,604

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	13	0	0	0	0	0	0	9,868
Waste Management	64	0	0	0	0	0	0	130,971
Program Management	16	0	0	0	0	0	0	28,406
Total	92	0	0	0	0	0	0	169,244

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

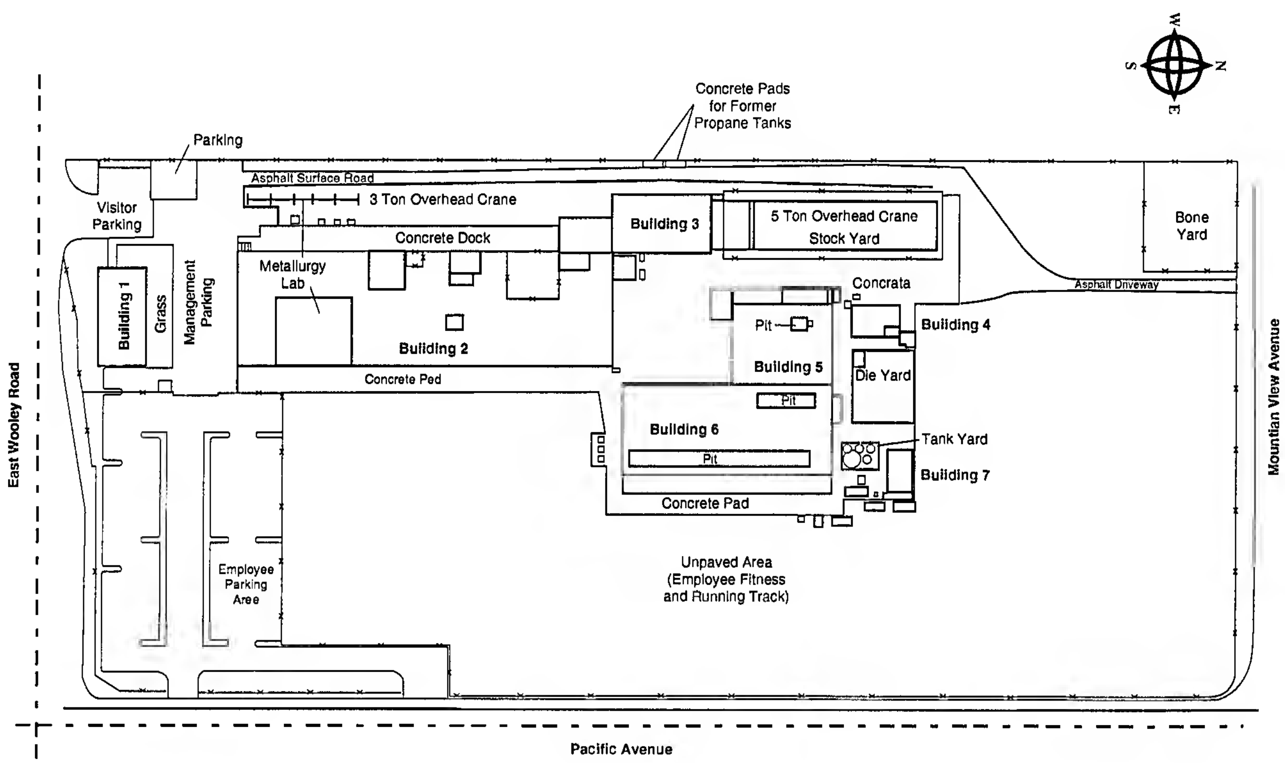
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Complete Site-Wide Assessment	2001
	Complete Interactive Region-8 Drainage Channel Interim Action	1997
	Complete Substation 505 Interim Action	1999
	Plating Shop Interim Action	2000
	Lower Salvage Yard Interim Action	2001
	Complete Site-Wide Remediation	2031
	Complete Surveillance and Monitoring Activities	2005
Waste Management		Fiscal Year
	Install New Oil-Water Separator at IR-8	1995
	Complete Radioactive and Mixed Waste Storage Facility Construction	1995
	Complete Hazardous Waste Management Activities	2030
	Complete Low-Level Waste Treatment Activities	2031

For further information on this site, please contact :	*Public Participation Office*	*(510) 637-1812*
	Public Affairs Office	*(415) 926-2204*
	Technical Liaison: Rich Fallejo	*(510) 637-1639*

OXNARD SITE

The Oxnard site is a 14-acre area located in the industrial section of Oxnard, California, approximately 50 miles northwest of Los Angeles.



Estimated Site Total

(Thousands of Current 1995 Dollars)

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	3,000	7,210	3,183	1,093	0	0
Program Management	500	515	530	546	0	0
Total	3,500	7,725	3,713	1,639	0	0

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	2,414	0	0	0	0	0	0	14,484
Program Management	349	0	0	0	0	0	0	2,092
Total	2,763	0	0	0	0	0	0	16,576

* Costs raflact a fiva-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Lifa Cycle is tha sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Oxnard is a 45-year-old industrial plant originally used from 1949 to 1981 to produce farm equipment. A contractor for the Department of Energy (DOE), Precision Forge, occupied the site from 1981 to 1984. The Department purchased the property in 1984 and will continue to produce forgings for weapon parts through calendar year 1995. The facility will then be returned to private concerns for economic development. DOE-Rocky Flats is the current landlord but landlord responsibilities will likely transfer to Environmental Management (EM) following completion of production. The Grand Junction Projects Office, Grand Junction, Colorado, has recently assumed responsibility for the remediation of the Oxnard site.

ENVIRONMENTAL RESTORATION

The Oxnard facility has been contaminated during its use as a metals-forging plant. Possible hazardous contaminants include polychlorinated biphenyls (PCBs), organic lubricants and coolants, chlorinated solvents, and heavy metals. While several environmental sampling programs have been conducted to determine the type of contamination, an extensive site assessment has not been performed and the extent of contamination has not been defined. Preliminary assessments indicated low concentrations of PCBs (less than 50 parts per million) and the presence of tetrachloroethane and fuel products in soil gases.

The next step is a characterization of the site. This will include collecting and analyzing soil and ground-water samples and assessing hydrogeologic conditions.

Depending on the extent of contamination, corrective measures may include the excavation of contaminated soils, the demolition and replacement of concrete structures, the disposal of contaminated materials, the installation of a water treatment system, and site restoration. Remediation of the Oxnard site is currently planned for completion in FY 1997. Regulatory drivers for this project will be defined when characterization activities are completed.

WASTE MANAGEMENT

There are no current or planned waste management activities conducted at Oxnard.

NUCLEAR MATERIAL AND FACILITY, STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Oxnard site.

LANDLORD FUNCTIONS

The landlord functions for Oxnard are managed through the Grand Junction Projects Office. Please see the Colorado site summary for details.

PROGRAM MANAGEMENT

Program management services are tracked and charged to waste management and environmental restoration activity budgets. However, for the purpose of this report program management costs are discretely identified.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Oxnard Site.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Oxnard								
Assessment	638	0	0	0	0	0	0	3,828
Remedial Actions	1,776	0	0	0	0	0	0	10,656
Total	**2,414**	**0**	**0**	**0**	**0**	**0**	**0**	**14,484**

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle
Program Management	349	0	0	0	0	0	0	2,092

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	2,414	0	0	0	0	0	0	14,484

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	349	0	0	0	0	0	0	2,092

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

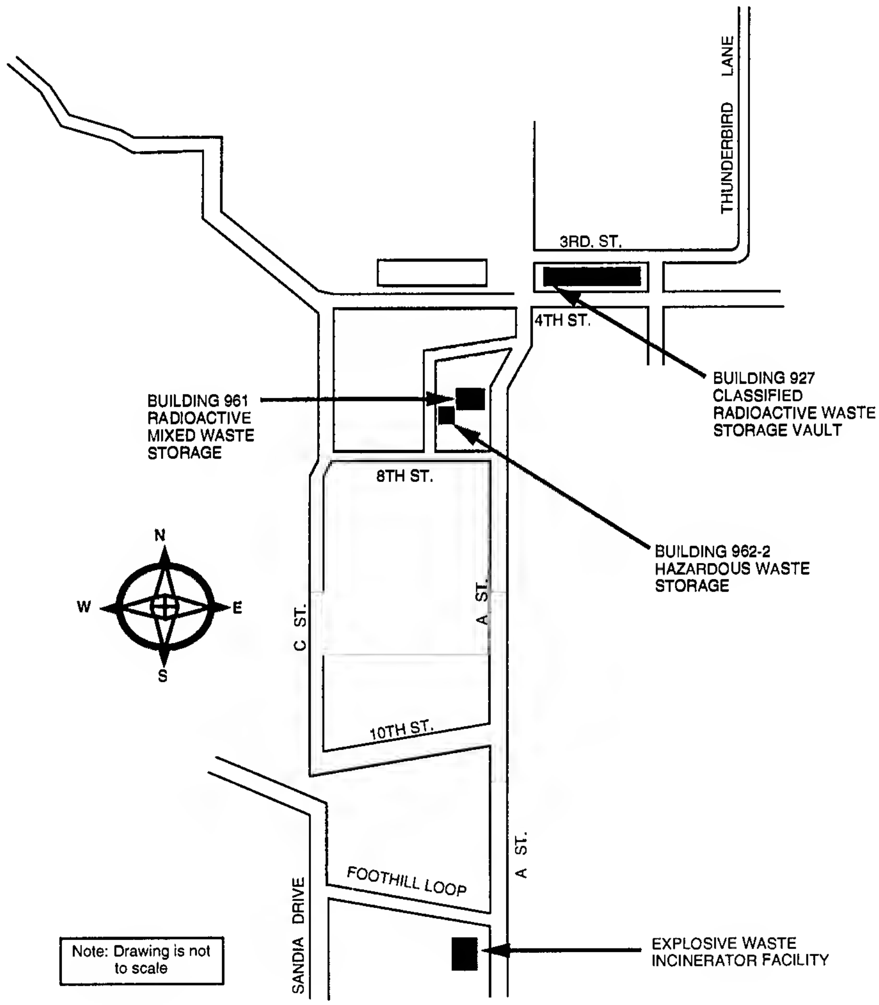
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	ER Characterization Complete	1995
	ER Remediation Complete	1997

For further information on this site, please contact : *Public Participation Office* *(505) 845-5951*
Public Affairs Office *(505) 845-6202*
Technical Liaison: Marilyn Bange *(505) 845-5160*

SANDIA NATIONAL LABORATORIES/CALIFORNIA

Sandia National Laboratories/California is located in Alameda County, California, about 40 miles east of San Francisco. It occupies about 413 acres of land in the Livermore Valley, and its boundaries start approximately 3 miles east of the Livermore City Center.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	2208.8	2667.2	2236	2193.6	32.8	0
Waste Management	1809	1821	1760	1839	1839	1839
Program Management	886	988	887	899	467	460
Total	4903.8	5476.2	4883	4931.6	2338.8	2299

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	1,490	0	0	0	0	0	0	8,943
Waste Management	1,690	2,971	2,971	2,971	2,971	2,971	2,408	96,447
Program Management	545	743	743	743	743	743	602	24,850
Total	3,726	3,714	3,714	3,714	3,714	3,714	3,010	130,240

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Sandia National Laboratories/California was established in 1956 to conduct research and development in the interest of national security, with principal emphasis on nuclear weapons development and engineering, excluding the actual nuclear materials. This primary mission continues unchanged at present and is expected to remain the same for the foreseeable future.

ENVIRONMENTAL RESTORATION

Contamination at the Sandia site has resulted from the disposal of hazardous wastes and accidental spills. A comprehensive assessment of contamination, begun in 1984, identified a potential for problems at the site of a fuel-oil spill, an old Navy landfill, and the site of an old commercial car repair shop, known as the Trudell site. Questions were also raised in 1988 about five other sites. However, contaminants in soil samples from these sites were found to be below the action levels specified in the Resource Conservation and Recovery Act (RCRA). The Regional Water Quality Control

Board has informed Sandia that no further action is required at these sites. The Board has primary regulatory responsibility for the site under cleanup orders 88-142 and 89-184.

Environmental restoration is scheduled to be completed in FY 1999. Costs estimates are given in the Environmental Restoration Projects table.

Fuel/Oil Spill

In 1975, an accidental puncture of an underground transfer line released 59,500 gallons of diesel fuel from an aboveground fuel tank into the soil. The ground water has been monitored since 1985 and shows occasional low-level contamination with fuel-oil components. The total volume of soil contaminated with diesel oil is estimated at 112,000 cubic yards.

Several bench-scale tests of methods for cleaning up the spill indicate that the most effective means is in-place biological remediation. This technique uses bacteria that digests the oil, with nutrients and oxygen added to stimulate their activity. A pilot study of this technique is now in progress. It addresses about 18 percent of the total area of contamination. After the pilot study is completed, Sandia expects to start full-scale biological remediation. Cleanup is expected to proceed at a rate of 20,000 cubic yards of soil per year and is to be completed in FY 1999.

Pending full cleanup, the Regional Water Quality Control Board has directed Sandia to implement an interim treatment for ground water. This interim treatment uses carbon beds to filter out the contaminants and an oil/water separator.

Navy Landfill Site

The Navy landfill, located at the southern end of the Sandia site, was used intermittently from 1940 to 1960 for the disposal of general construction debris and machine turnings. Over the past 5 years, quarterly monitoring of ground water beneath the landfill has consistently shown chromium and nitrate concentrations that were higher than drinking water standards and nickel concentrations that were above the 1993 maximum concentration limit. However, several investigations have found no evidence that hazardous materials were buried at the landfill.

Because no evidence of hazardous waste disposal has been found, Sandia has submitted a recommendation of No Further Action to the Regional Water Quality Control Board. The Board has reviewed the results of the investigations at the Navy landfill and Sandia's request. The Board is now requesting a formal closure plan.

Nonetheless, Sandia does intend to implement other remedial actions at the Navy landfill because of risks identified in the environmental impact statement—namely, the possibility that an earthquake could affect the stability of the landfill. This was deemed a potential threat to onsite workers. Sandia plans to cap the landfill and to use other stabilization and erosion-control measures as appropriate.

The Trudell Site

The Trudell Site, which housed a commercial car repair shop, was purchased by the Department of Energy (DOE) in 1987 and DOE agreed to remediate the site as part of a land-purchase agreement. The site was cleaned up in 1989 and 1990, and soil contaminated with oil, lead, and low levels of chlorinated solvents was shipped to an approved landfill for disposal. The Regional Water Quality Control Board certified the cleanup as completed in December 1990, but it did require Sandia to continue ground-water monitoring indefinitely. This estimate assumes that wate management activities conducted by the Environmental Management program in support of the laboratory's on-going Defense Programs

mission will be truncated in the year 2030. This assumption was used for all DOE laboratories where clean up is completed prior to 2030 and the Environmental Mangement program is not the site landlord.

WASTE MANAGEMENT

Four types of waste are generated at the Sandia site: low-level radioactive waste, low-level mixed waste, hazardous chemical waste, including substances controlled by the Toxic Substances Control Act (e.g., asbestos, polychlorinated biphenyls (PCBs), and biohazardous waste). Low-level and mixed waste are generated from the site's research and development activities. The generation rates for low-level mixed waste and hazardous chemical waste are expected to remain fairly constant through FY 2000. Sandia has shipped its mixed waste to Sandia National Laboratories/New Mexico.

This estimate assumes that waste management activities conducted by the EM program in support of the Laboratory's ongoing Defense Programs mission will be truncated in the year 2030. This assumption was used for all DOE laboratories where clean up is completed prior to 2030 and the EM program is not the site landlord.

Waste Treatment

Sandia is conducting research to identify preferred methods for treating the waste currently in storage and those to be generated.

The options available for low-level radioactive waste treatment are compaction, encapsulation, stabilization, or consolidation, depending on the form of the waste. Both these approaches reduce volumes and disposal costs.

Examples of treatment options for Sandia/California's low-level mixed waste include wet oxidation, thermal desorption, and chemical stabilization/solidification. Since all of the mixed waste at Sandia/California has been shipped to Sandia/New Mexico, it will be treated there. Some of the waste such as tritium scintillation vials and non-halogenated clear solvents has been and will continue to be transferred to an approved government or commercial facility for treatment and disposal.

Hazardous chemical waste is typically compacted, consolidated, or commingled to reduce volume, liability, and costs before treatment and disposal at a licensed commercial facility.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmentol Restoration								
Remedial Actions	1,490	0	0	0	0	0	0	8,943

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Waste Storage

Separate storage facilities are provided for low-level and mixed waste (buildings 961 and 968/129 respectively) and hazardous chemical waste (building 962-2). Storage volumes vary according to disposal schedules. For example, low-level waste is stored until a full truckload of waste certified to be suitable for disposal at the Nevada Test Site is accumulated. No new storage facilities are planned at present.

Waste Disposal

No waste is disposed at the Sandia site at Livermore. Low-level waste is shipped to the Nevada Test Site for disposal. Some low-level mixed waste is shipped to a licensed commercial facility in Florida. Hazardous waste is shipped to licensed commercial facilities.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at Sandia National Laboratory/California.

LANDLORD FUNCTIONS

Defense Programs is the landlord of Sandia National Laboratories/California, but Environmental Management program provides and maintains the infrastructure that it requres.

PROGRAM MANAGEMENT

Program management represents cross-cutting activities associated with all waste types and not directly in support of specific operations or projects.

Management activities can be divided into categories, such as support for the environmental safety and health program; quality assurance; the training of personnel and contractors; emergency response; fire protection, centralized engineering and maintenance; and safeguards and security.

An important management function is regulatory support to ensure compliance with environmental regulations and laws. This includes providing guidance on regulations and policy development as well as compliance tracking.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-level Waste	1,027	1,805	1,805	1,805	1,805	1,805	1,476	58,666
Hazardous Waste	663	1,166	1,166	1,166	1,166	1,166	932	37,781
Total	1,690	2,971	2,971	2,971	2,971	2,971	2,408	96,447

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Management is also responsible for the waste-minimization program which tracks the amount of waste generated at the site and encourages the use of waste reduction methods.

Program management also provides opportunities for public involvement by holding public hearings, soliciting comments on environmental plans and reports, and providing information (e.g., the Environmental Protection newsletter).

Program management services are tracked and charged through the budgets for waste management and environmental restoration activities. For the purposes of this report, 20 percent of the site's budget has been allocated for program management activities. These costs are described in the Program Management Cost Estimate table.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Sandia National Laboratories/California.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	545	743	743	743	743	743	602	24,850

* *Costs reflect a five-year everage in constant 1995 dollers, except in FY 1995-2000, which is e six-year average.*

** *Total Life Cycle is he sum of annual costs in constant 1995 dollers.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Management	1,690	2,971	2,971	2,971	2,971	2,971	2,408	96,447
Program Management	545	743	743	743	743	743	602	24,850
Total	3,461	3,714	3,714	3,714	3,714	3,714	3,010	121,294

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	1,490	0	0	0	0	0	0	8,943

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

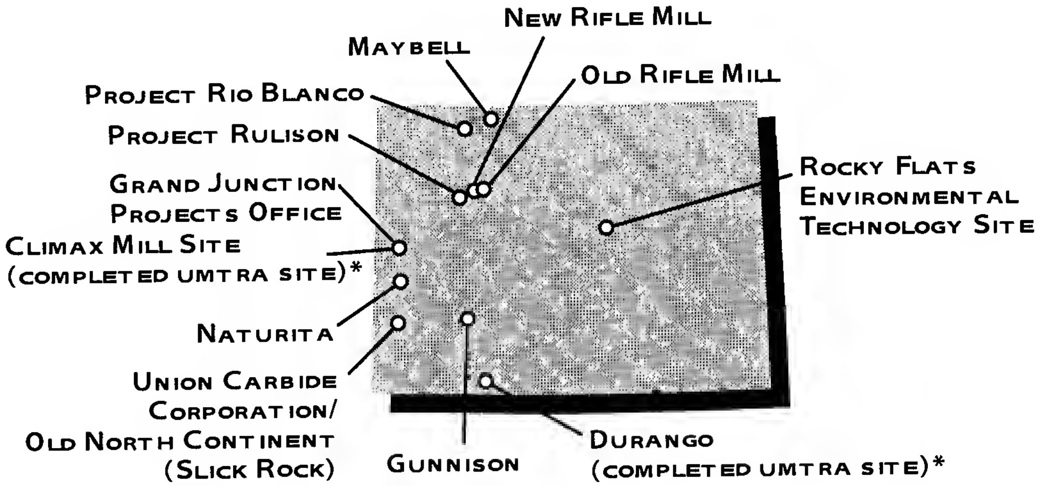
*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
Sandia/California	Fuel Oil Spill Remediation Completed	1999
	Navy Landfill Remediation Completed	1997
Defense Programs	Truncote waste management support	2029

For further information on this site, please contact :

	Public Participation Office	*(505) 845-5951*
	Public Affairs Office	*(505) 294-3135*
	Technical Liaison: Ted Pietock	*(505) 845-5649*



*Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for these facilities are provided in the table below.

COLORADO

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Grand Junction Project Office Site	18,750	26,840	32,810	29,380	36,700	54,180
Gunnison	4,250	2,030	1,210	560	1,730	740
Maybell	11,970	9,760	4,270	250	50	0
Naturita	14,340	7,410	2,370	460	290	910
Old Rifle and New Rifle	21,521	5,801	708	2,051	2,081	939
Rio Blanco/Rulison	70	70	70	1,070	2,070	1,170
Rocky Flats	704,350	718,060	725,700	775,910	804,910	784,870
Union Carbide Corporation	10,790	9,910	630	420	670	1,240
Completed UMTRA-Surveillance & Monitoring	20,690	20,530	23,890	20,190	7,000	1,620
Total	806,731	800,411	791,658	830,291	855,501	845,669

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Grand Junction Project Office Site	22,980	23,216	27,084	28,857	28,752	17,313	18,936
Gunnison	1,863	691	690	0	0	0	0
Maybell	4,653	0	0	0	0	0	0
Naturita	4,561	552	429	0	0	0	0
Old Rifle and New Rifle	5,858	691	783	0	0	0	0
Rio Blanco/Rulison	696	105	25	21	12	8	6
Rocky Flats	697,965	544,186	752,899	517,420	523,778	538,708	516,196
Union Carbide Corporation	4,187	737	614	195	0	0	0
Completed UMTRA-Surveillance & Monitoring	16,623	1,006	1,145	183	0	0	0
Total	759,386	571,183	783,669	546,676	552,542	556,029	535,139

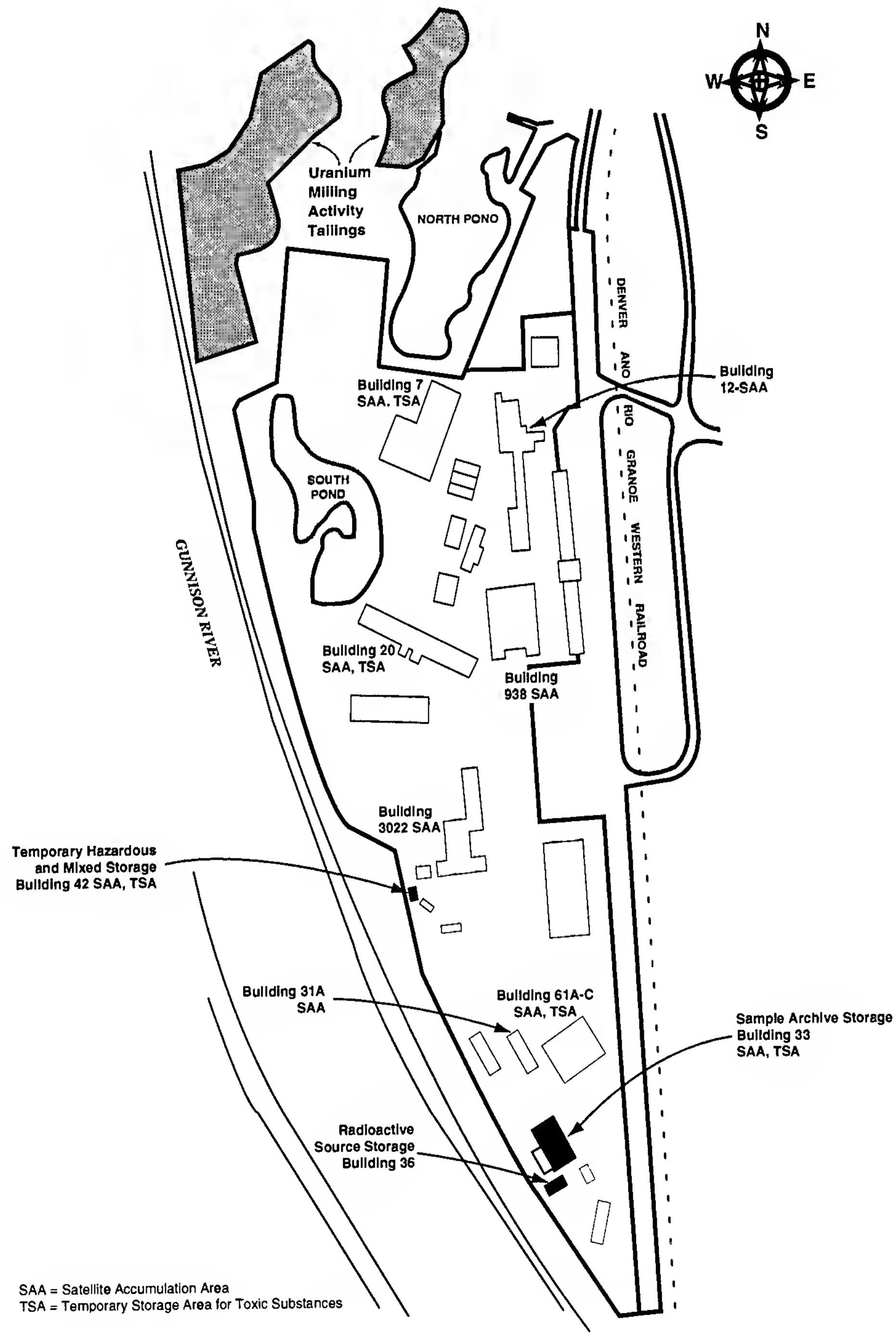
	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Grand Junction Project Office Site	0	0	0	0	0	0	0	858,669
Gunnison	0	0	0	0	0	0	0	18,078
Maybell	0	0	0	0	0	0	0	27,921
Naturita	0	0	0	0	0	0	0	32,271
Old Rifle and New Rifle	0	0	0	0	0	0	0	42,515
Rio Blanco/Rulison	1	0	0	0	0	0	0	5,073
Rocky Flats	537,065	458,188	623,452	597,082	639,337	236,371	0	36,611,203
Union Carbide Corporation	0	0	0	0	0	0	0	32,852
Completed UMTRA-Surveillance & Monitoring	0	0	0	0	0	0	0	111,407
Total	537,066	458,188	623,452	597,082	639,337	236,371	0	37,739,989

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

GRAND JUNCTION PROJECTS OFFICE

The Grand Junction Projects Office site is located on a 56.4-acre site, 2 miles south of the City of Grand Junction in western Colorado.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	10,470	15,980	21,020	15,060	17,980	25,670
Directly Appropriated Landlord	6,140	7,590	7,490	11,240	15,040	23,260
Program Management	2,140	3,270	4,300	3,080	3,680	5,250
Total	18,750	26,840	32,810	29,380	36,700	54,180

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	16,283	16,096	19,964	21,737	21,632	10,193	11,816	604,889
Directly Appropriated Landlord	6,538	7,100	7,100	7,100	7,100	7,100	7,100	252,231
Program Management	158	20	20	20	20	20	20	1,549
Total	22,980	23,216	27,084	28,857	28,752	17,313	18,936	858,669

** *Costs reflect a five-year avarage in constant 1995 dollers, except in FY 1995 - 2000, which is e six-year everege.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSION

The site was originally established in 1943 under the Manhattan Engineer District. Between 1943 and 1946, the U.S. Vanadium Corporation constructed and operated a uranium refinery for the Federal Government at the site.

In 1947, the Grand Junction Projects Office Site became the Colorado Raw Materials Office for the Atomic Energy Commission and administered the U.S. defense-related uranium exploration and purchase programs through 1970. From 1974 through 1984, the site managed the National Uranium Resource Evaluation program.

The primary mission of the Grand Junction Projects Office site is to support Environmental Management (EM) in remedial action, decommissioning, and technology development and demonstration.

Current assignments for the Grand Junction Projects Office include the Monticello (Utah) Superfund Program that encompasses the Monticello Remedial Action Project, the Monticello Vicinity Properties Project, and the Monticello Surface and Groundwater Remedial Action Project; the Grand Junction Projects Office Remedial Action Project; Oxnard; the Long-Term Surveillance and Maintenance Program for remediated sites that are the Department of Energy's (DOE) responsibility; the DOE Uranium Leasing Project; landlord

operation and maintenance activities; and waste management. Additional information on the Monticello and Oxnard sites is contained in the Utah and California sections, respectively.

The Grand Junction Projects Office provides direct support to Environmental Management in the areas of site characterization, project integration and coordination, remedial design, remedial action, independent verification, assessment of technology needs, geosciences, and analytical chemistry. This support currently accounts for 50 percent of the Grand Junction Projects Office funded activities and is expected to increase in succeeding years. Therefore, landlord activities for the Grand Junction Projects Office are planned to be ongoing, and costs estimates are provided through FY 2030.

ENVIRONMENTAL RESTORATION

A pilot-plant uranium recovery program at the Grand Junction Projects Office site was initiated in 1953 with the construction of a small facility intended for research and development of a resin-in-pulp milling process. It is estimated that between May 1953 and December 1954, when the plant was dismantled, a total of 2,600 tons of uranium ore was processed. All but 25 tons of this ore was leached with sulfuric acid.

After 1954, the pilot-plant program was dedicated to amenability testing of uranium ores and to the development and testing of new uranium milling processes. A new larger pilot plant was constructed in the south portion of the Grand Junction Projects Office facility. From 1954 until it was closed in 1958, the pilot-plant operated 3 shifts, 24 hours a day, 7 days a week. Approximately 30,000 tons of uranium ore were processed.

The Grand Junction Projects Office Remedial Action Project was established to remediate the Grand Junction Projects Office site. Pilot-plant operations at the site were believed to be almost exclusively responsible for the contaminated material buried at the facility. The contaminated material consisted of uranium mill tailings, ore, and related process equipment.

The selected alternative was to remove contaminated materials from the site and co-dispose with Uranium Mill Tailings Remedial Action Program tailings at the Uranium Mill Tailings Remedial Action disposal site at the Cheney Disposal Cell. Complete removal of contaminated material will eliminate both radiation contamination and the future potential for contamination of the Gunnison River adjacent to the site. Removal of contaminated material also will allow for the natural dispersion and elimination of contaminants in the alluvial aquifer beneath the site.

Radioactive waste at the Grand Junction Projects Office facility totaling 414,000 tons has been excavated and hauled to the Cheney Disposal Cell. The material will be compacted and covered with an earthen radon barrier and an erosion-protection layer of rock.

Because the ground-water system is characterized by flushing of the alluvial aquifer, cleansing of the affected ground water should ensue. Ground-water modeling indicates that the shallow alluvial aquifer will flush itself of contaminants in 50 to 80 years, which is within compliance with the proposed Uranium Mill Tailings Remedial Action ground-water regulations (100-year cleanup).

Upon removal of tailings and other contaminated material, affected areas of the Grand Junction Projects Office facility have been recontoured, reconstructed, and revegetated as appropriate. Currently, contaminated portions of the Grand Junction Project Office facility are being restored for unrestricted use. Ultimately, no tailings-related

environmental hazards are anticipated to remain at the facility. The facility will initiate a long-term monitoring program to verify passive ground-water restoration.

The mission of the Long-Term Surveillance and Maintenance Program is to provide long-term care and custody of all completed DOE remote/ offsite remedial action project sites as well as other sites, as assigned. Care of these sites includes inspections, security, environmental monitoring, site maintenance, regulatory compliance, compliance reporting, records management, public relations, emergency response, and further remedial action, if required.

The Uranium Leasing Project is made up of two separate functions – the DOE Uranium Lease Management and Test Pit Maintenance. The Grand Junction Projects Office provides the necessary managerial and administrative support for the Uranium Leasing Management Program. The program administers 43 DOE uranium lease tracts covering 25,000 acres in Colorado (38 sites), Utah (4 sites), and New Mexico (1 site). The Test Pit Maintenance Program maintains the four DOE calibration facilities located in Colorado, New Mexico, Texas, and Wyoming, in operational condition.

WASTE MANAGEMENT

Treatment Storage and Disposal Operations

Waste management activities at the Grand Junction Projects Office are funded within the scope of environmental restoration activities.

The primary source of operationally generated waste at the Grand Junction Projects Office originates from the analytical laboratory. Secondary sources of operational waste are from facility maintenance and office support functions. The cumulative quantities of regulated waste from these sources are extremely low compared to other DOE sites. The 1993 Annual Waste Management Report lists the Grand Junction Projects Office's Resource Conservation and Recovery Act

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	4,766	1,472	1,706	1,977	2,291	2,655	3,077	94,481
Remedial Actions	0	14,624	18,258	19,760	19,342	7,538	8,739	441,305
Facility Decommissioning	11,477	0	0	0	0	0	0	68,862
Long Term Surveillance and Monitoring	40	0	0	0	0	0	0	241
Total	16,283	16,096	19,964	21,737	21,632	10,193	11,816	604,889

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

(RCRA) regulated, State regulated, Toxic Substances Control Act (TSCA) regulated, and mixed-Toxic Substances Control Act waste generation rate as less than 1 metric ton each.

Commercial treatment, storage, and disposal facilities will be used for hazardous waste. Candidate waste streams will be evaluated individually for offsite shipment determination. Sanitary wastes are directed to the local publicly owned treatment works. Specific disposal options for environmental restoration waste from Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sites will be evaluated based on the record of decision for the remediation project. The Grand Junction Projects Office Site Treatment Plan and resulting consent agreement will address onsite waste streams including specific treatment facilities and treatment technologies.

The Grand Junction Projects Office acts as Program Manager for the Mixed Waste Treatment Program, supporting the Albuquerque Operations Office in pursuing the overall objective of the program to reduce the inventory of mixed waste existing at the nine sites managed by the Albuquerque Operations Office, in accordance with Site Treatment Plans required by the Federal Facility Compliance Agreement. In addition to the program management responsibilities, the Grand Junction Projects Office is also tasked with developing portable treatment technologies for use at other Albuquerque Operations Office sites.

The implementation phase of the program involves the deployment of the mobile treatment units to the various Albuquerque Operations Office sites and treatment of the mixed waste inventory.

The Grand Junction Projects Office will also be responsible for the physical operation, maintenance, and refabrication/refurbishment of those portable treatment units developed at the Grand Junction Projects Office. These include the thermal desorption, evaporative oxidation, and wastewater evaporator units. Refabrication/refurbishment will be required once during the second phase of the program to maintain the treatment capability.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Grand Junction Projects Office.

LANDLORD FUNCTIONS

The EM landlord function is to ensure compliance with all regulations and orders applicable to the operation of a Federal facility. This responsibility includes providing a safe, secure, and environmentally sound workplace for personnel assigned to the various Grand Junction Projects Office programs. Landlord support provides for the planning operation, energy management program, general site maintenance, major maintenance improvements, safeguards and security, medical services, environmental monitoring, and most support services at the Grand Junction Projects Office.

Landlord activities include routine preventive and corrective maintenance activities and major maintenance activities necessary to extend the useful life of the existing facilities. Work force, materials, subcontract services, engineering services, and management from the landlord program organization supports the nonprogrammatic compound activity and provides for continued efficient operation, safeguards and security, environmental monitoring, and personnel safety and health at the Grand Junction Projects Office.

PROGRAM MANAGEMENT

The Grand Junction Projects Office has no separate funding for program management. All program management activities are performed within the budget for environmental restoration activities. For the purposes of this report, 17 percent of the Environmental Restoration sites budget has been allocated for program management activities for FY 1995-FY 2000.

Public Participation

Monthly city, county, and regulatory agency information and discussion meetings and Site-Specific Advisory Board meetings form the core of Grand Junction Projects Office stakeholder and public participation activities. Additionally, ongoing communication and interaction is maintained with the communities in which the Grand Junction Projects Office is managing environmental restoration programs through an active Speakers Bureau, site tours, educational outreach programs concentrating on the sciences and environmental topics, and the issuance of regular press releases to update project progress and future work schedules.

Stakeholders include, but are not limited to regulators, Federal, State, and local elected officials; Native Americans; Monticello Site-Specific Advisory Board; local communities; property owners; several departments within the States of Utah and Colorado; U.S. Forest Service; Bureau of Land Management; environmental groups; and recreational groups.

Waste Minimization and Pollution Prevention Awareness Program

The Grand Junction Projects Office Waste Minimization and Pollution Prevention Awareness Program focuses on efforts that provide improved protection of health and the environment and result in a reduction in overall costs, liabilities, and risks associated with the treatment and disposal of wastes. This is accomplished through hazardous material substitution, the recycling of various materials (including used oil and spent lead/acid batteries, paper and cardboard), as well as waste minimization and pollution prevention training. Other activities include the formation of Waste Minimization Committees to help formulate methods for the reduction of all types of onsite generated wastes, included non-regulated solid wastes.

Landlord Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Directly Appropriated Landlord	6,538	7,100	7,100	7,100	7,100	7,100	7,100	252,231

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Grand Junction Projects Office.

Program Management Cost Estimate

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	158	20	20	20	20	20	20	1,549

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	16,283	16,096	19,964	21,737	21,632	10,193	11,816	604,889
Directly Appropriated Landlord	6,538	7,100	7,100	7,100	7,100	7,100	7,100	252,231
Program Management	158	20	20	20	20	20	20	1,549
Total	22,980	23,216	27,084	28,857	28,752	17,313	18,936	858,669

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

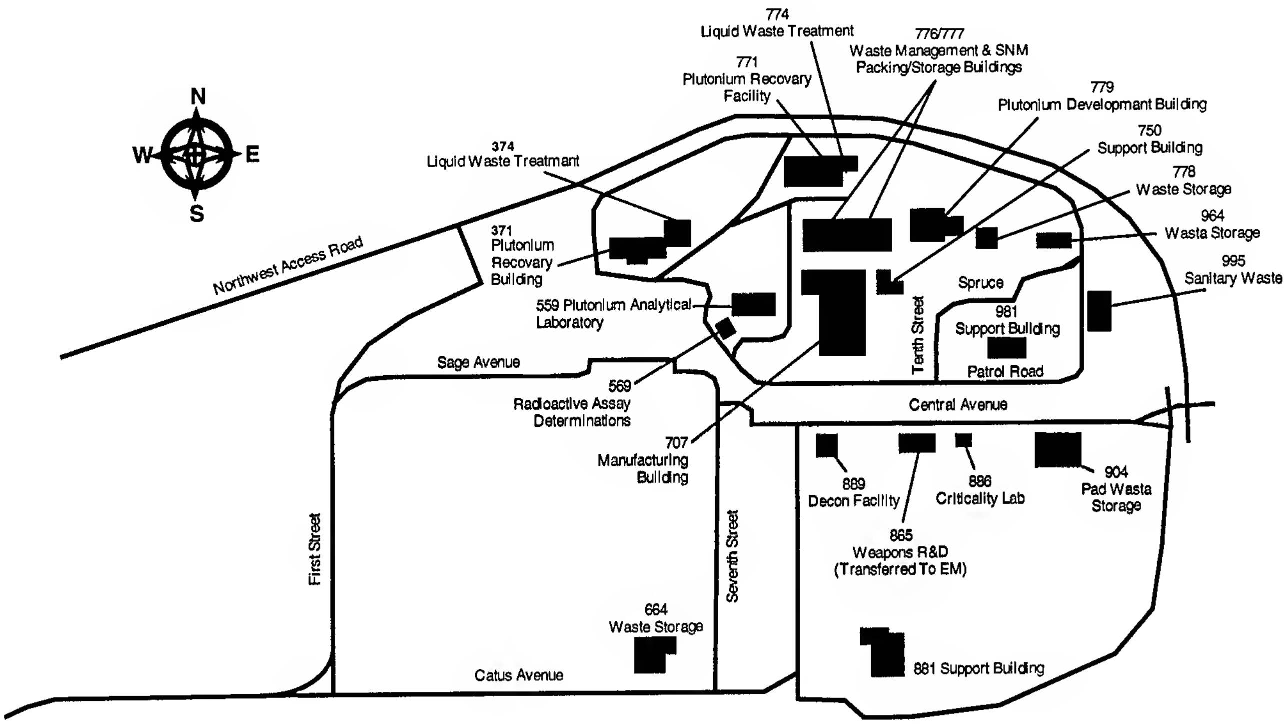
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
Grand Junction Project Office Remedial Action Project	Complete site assessment/remediation and reconstruction	2030

For further information on this site, please contact: *Public Participation Office (505) 845-5951*
Public Affairs Office (505) 845-5136
Technical Liaison: Chris Pennal (303) 248-6011

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

The Rocky Flats Environmental Technology Site is located in northern Jefferson County, approximately 16 miles northwest of Denver; Colorado. The site encompasses 11 square miles including the "buffer zone" that surrounds the site.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	160,950	176,270	166,910	167,360	179,980	195,290
Waste Management	180,930	206,120	227,690	271,910	300,440	298,080
Nuclear Material and Facility Stabilization	207,790	166,950	159,010	154,740	153,130	147,100
Directly Appropriated Landlord	117,900	122,800	127,210	131,460	127,110	108,520
Program Management	36,780	45,920	44,880	50,440	44,250	35,880
Total	704,350	718,060	725,700	775,910	804,910	784,870

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	161,824	85,733	106,664	132,431	145,253	216,177	271,635
Waste Management	228,094	285,131	255,465	254,233	253,197	236,731	152,419
Nuclear Material and Facility Stabilization	154,052	58,050	271,316	4,920	277	230	11
Directly Appropriated Landlord	113,980	81,320	81,320	81,320	81,320	12,467	12,467
Program Management	40,015	33,951	38,135	44,517	43,731	73,103	79,664
Total	697,965	544,186	752,899	517,420	523,778	538,708	516,196

	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	379,450	337,389	467,596	447,645	459,190	174,211	0	17,087,804
Waste Management	73,153	37,051	35,000	34,942	28,963	0	0	9,599,996
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	2,598,336
Directly Appropriated Landlord	12,467	12,467	12,467	12,467	12,467	9,974	0	2,796,494
Program Management	71,995	71,282	108,389	102,028	138,717	52,186	0	4,528,573
Total	537,065	458,188	623,452	597,082	639,337	236,371	0	36,611,203

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

Built in 1951, the Rocky Flats Plant's primary mission from 1952 to 1989 was the production of components for nuclear weapons. The final products included components and assemblies manufactured from uranium, plutonium, beryllium, stainless steel, and other metals. Production activities included metalworking, fabrication and component assembly, plutonium recovery and purification, and associated quality control functions. In addition, research and development in chemistry, physics, metallurgy, materials technology, nuclear safety, and mechanical engineering were conducted to advance the plant's mission.

In 1989, many of the plant's production functions were suspended, and full operations to produce nuclear weapons components are not scheduled to resume. In January 1992, in response to a changing international political climate, President Bush announced the decision to cancel the W-88 warhead program. This decision resulted in the discontinuation of nuclear production at Rocky Flats. Although production of nonnuclear components continued through September 1994, the termination of nuclear production changed the primary mission of the site from nuclear weapons production to cleanup and restoration.

The site's new mission focuses on environmental management and possible economic development. The approach being taken is to reduce risk and accelerate cleanup. A description of the strategy to accomplish the mission involves remediation, waste storage, treatment and disposal, consolidation of materials, deactivation of buildings, and decommissioning. Accelerated cleanup activities, including removal of hot spots and some capped areas, will occur until 2012. Stabilization and repackaging of plutonium-containing materials, removal of plutonium from the ducts, and Resource Conservation and Recovery Act (RCRA) closures of tanks will occur between 1995 and 2010. Consolidation of special nuclear materials, classified documents, and other sensitive materials into fewer, more centralized locations also is planned. Interim alternative use of many facilities for waste storage is expected. Deactivation of plutonium and nonplutonium facilities will generally occur before 2010. Special nuclear material and residues are assumed to be removed from the site by 2010. Decommissioning activities will dominate site activities after 2020. Waste treatment, storage, and disposal, which is ongoing, will continue until 2055 when the last plutonium-contaminated facility is expected to be dismantled.

The timeline described provides only a rough estimate for outyear activities and is only one range of alternatives. This alternative was useful for analysis because it demonstrates the extremely large waste volumes to be generated. It is also a conservative approach to cleanup and was chosen so as not to preclude an endstate determination. The sequence of events is derived from the current understanding of site priorities. Funding allocations dictate the length of the schedule. The availability of disposal sites also has the potential to become a major schedule constraint, if related assumptions prove invalid.

The ultimate use of Rocky Flats will be based significantly on stakeholder input and could range from totally unrestricted use to totally restricted use, or a combination of the two. The current interim use and scenario description are not intended to prejudice the endstate. The dedication of the northwest corner of Rocky Flats for use by the National Renewable Energy Laboratory will continue.

The restoration activities are conducted by the Department of Energy's (DOE) Environmental Management program. However, the Department's Defense Programs funding will

continue to fund Defense Programs-related special nuclear materials mission requirements and scope for as long as the special nuclear material remains at the site.

ENVIRONMENTAL RESTORATION

In the process of fulfilling its national security mission, Rocky Flats used materials and processes contaminating facilities, soil, ground water, and surface water with chemical and radioactive substances (plutonium, americium, and uranium). Ground-water and surface water contamination is a potential concern due to the close proximity of a major metropolitan area downstream from the site. Contamination in shallow ground water has been detected in many areas including the 881 Hillside Area; 903 Pad, Mound, and East Trenches Areas; the Solar Evaporation Ponds; Present Landfill; and the West Spray Field. In most cases, the contaminants of concern are associated with volatile organic compounds that include chemical products previously used as cleaning and degreasing solvents. Inorganic, dissolved metals and some radionuclides also have been detected in localized areas.

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
881 Hillside	1,806	1,062	1,222	569	1,431	1,226	1,226
903 Pad & East Trenches	12,444	4,204	4,875	5,610	6,504	4,860	4,860
Facility Decommissioning	23,827	23,729	37,160	55,180	56,408	137,296	192,978
Landfill	3,460	447	527	528	636	739	685
Offsite Projects	1,062	0	0	0	0	0	0
Plant Areas/Facilities	25,737	19,561	21,319	23,134	25,973	18,909	18,864
Program Management	21,787	21,917	21,917	21,917	21,917	21,917	21,917
Rocky Flats Treatment/Storage/Disposal	28,618	11,937	16,687	22,194	28,570	28,194	28,194
Solar Pond	28,705	1,988	2,305	2,653	3,076	2,298	2,298
Spray Fields	419	0	0	0	0	0	0
Surface Water	13,959	888	653	646	737	737	614
Total	161,824	85,733	106,664	132,431	145,253	216,177	271,635

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
881 Hillside	1,226	164	164	164	984	0	0	58,035
903 Pad & East Trenches	655	655	655	655	3,930	0	0	261,984
Facility Decommissioning	224,258	230,680	355,888	337,592	433,732	174,211	0	11,438,515
Landfill	96	96	96	96	576	0	0	43,363
Offsite Projects	0	0	0	0	0	0	0	6,374
Plant Areas/Facilities	10,349	2,928	2,928	2,928	17,568	0	0	976,725
Program Management	0	0	0	0	0	0	0	788,233
Rocky Flats Treatment/Storage/Disposal	142,465	102,465	107,465	105,809	0	0	0	3,141,598
Solar Pond	310	310	310	310	1,860	0	0	260,814
Spray Fields	0	0	0	0	0	0	0	2,511
Surface Water	91	91	91	91	540	0	0	109,651
Total	379,450	337,389	467,596	447,645	459,190	174,211	0	17,087,804

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Soil contamination is highest east and southeast from the temporary storage area (903 Pad) where steel drums were used to store plutonium-contaminated industrial oils from 1958 to 1968. Some plutonium particles entrapped in the fine fraction of top soil were blown by winds and deposited on soils in an east-southeast direction. Soils sampled in 1993 showed the highest plutonium concentrations in soil samples taken from the eastern portion of the buffer zone.

There are more than 400 structures at the Rocky Flats Environmental Technology Site. Of these structures, 19 contain the majority of special nuclear material, classified products, radioactive and hazardous inventories, and radioactive and chemical contamination. Major building contamination table depicts the types of contaminants at each of the major buildings at the site. The remainder of the facilities are uncontaminated or marginally contaminated support facilities.

The Rocky Flats Environmental Technology Site has identified and prioritized 177 contaminated sites that are located both onsite and offsite. These sites have been grouped into 16 operable units according to location and type of contamination. The Department is assessing contamination in these operable units and is implementing cleanup activities. Sites with potentially higher health and environmental risks are being addressed before sites with potentially lower risk. Individual operable unit activities assume a specific future land use scenario.

The legal framework establishing the scope and schedule for projects in the environmental restoration program is the Interagency Agreement. The Interagency Agreement integrates the authority and jurisdiction of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Research and Conservation Recovery Act (RCRA). Therefore, the investigative phase at each operable unit is referred to as a RCRA Facility Investigation/Remedial Investigation, and the selection of remedial alternatives is referred to as a Corrective Measure Study/ Feasibility Study. The National Environmental Policy Act process is also completed in conjunction with the RCRA process.

The primary objective of the environmental restoration program is to assess and clean up Rocky Flats in compliance with applicable environmental laws and regulations. Other objectives of the program are treatment, storage, and disposal of environmental restoration waste and deactivation, decontamination, decommissioning, and demolition. Activities associated with these functions include characterizing the extent and nature of contamination and its potential risks; removing or stabilizing contaminant sources; remediating contaminated soils, ground water, and surface water; deactivation, decontamination, decommissioning, and demolition of surplus facilities; and surveillance and postclosure monitoring.

The following activities for each operable unit must be performed to fulfill environmental restoration objectives at Rocky Flats. In addition to these activities, surveillance and monitoring activities are required after the closure of each operable unit.

Operable Unit 1 Activities (Hillside 881)

The alluvial water in Operable Unit 1, also called the Hillside 881, was contaminated during the 1960's and 1970's with solvents and radionuclides from leaking drums, scrap metals, sludge, and liquid waste. Major contaminants at the operable unit are radionuclides and organic compounds. Restoration activities include the cleanup of volatile organic compounds in the ground water and polycyclic aromatic hydrocarbons and plutonium in the surface soils.

Funding for interim actions will provide for the operation, maintenance, and process improvement of Building 891's ground-water treatment facility and for the coordination of plant services to operate the facility. Also included is the remediation of the French Drain, which was constructed to prevent contaminated ground water from reaching Woman Creek.

In FY 1995, the Department will submit a detailed analysis in the Final Corrective Measures Study/Feasibility Study Report submitted to the Environmental Protection Agency (EPA) and the Colorado Department of Public Health and Environment for review and comment. In FY 1994, the Final Phase III RCRA Facility Investigation/Remedial Investigation was delivered to the regulatory agencies for approval. The record of decision phase will commence in FY 1995, with completion scheduled for the first quarter of FY 1996.

Activities related to performance monitoring include monitoring of remediation operations and documentation of the performance as required by regulatory directives. These activities will extend into FY 2035.

Project support activities include administrative tasks, training requirements, contingency, Assessment Management Reserve, Remedial Management Reserve, Assessment and Financial Commitments, Remedial Financial Commitments, and wetlands monitoring and reporting. Project support activities will extend the life of the project.

Operable Unit 2 Activities (903 Pad & East Trenches)

In Operable Unit 2; which contains the 903 Pad, Mound, and East Trenches; the storage of waste drums during the 1950's and 1960's allowed hazardous and radioactive materials to leak into the soil. In addition, the East Trenches area of the unit was used for disposal of plutonium- and uranium-contaminated waste and sanitary sewage sludge. Radionuclides and organic compounds are the potential major contaminants at the operable unit. The scope of Operable Unit 2 restoration activities includes the support of the cleanup of low-level radionuclides (plutonium, americium, and uranium), volatile organic compounds, and metals.

Funding for interim remedial action remediation supports the continuation of the Field Treatability Unit operations and maintenance, which provide treatment of South Walnut Creek surface water. This operation will continue until FY 1998. The funding also supports testing and operations of the Soil Vapor Extraction Unit to remove residual free-phase volatile organic compound contamination in the subsurface soils. Some soils contaminated with organics and metals may be excavated and removed to onsite RCRA-compliant storage cells or shipped to commercial storage. The Remedial Investigation Report, which summarizes the validated data obtained from the field investigation in accordance with regulator guidance, will be completed during FY 1995. The feasibility study, along with the submission and agency approval of the Corrective Measures Study/Feasibility Study Report, will be completed during FY 1997. The record of decision will commence in FY 1997 and is scheduled to be completed in FY 1998. The completion of the Title II design of the remedial action design is expected in FY 1998.

Funding for safety analysis report activities supports the development of a safety analysis report in accordance with Department directives to ensure the Title II design and proposed operating procedures meet or exceed safety standards. These activities also provide full documentation and complete self-auditing of design before construction begins. The corrective action and remedial action construction will begin in FY 1999 and will be complete in FY 2001.

Performance monitoring includes activities to monitor remediation operations and to provide documentation of restoration performance as required by EPA and DOE directives.

Project support includes administrative tasks, training requirements, contingency, Assessment Management Reserve, Remedial Management Reserve, Assessment Financial Commitments, Remedial Financial Commitments, and wetlands monitoring and reporting. Project support activities will continue through the life of the project.

Operable Unit 3 Activities (Offsite Areas)

Operable Unit 3, the Offsite Areas, contains soil contamination caused resuspension of soils by the wind from the 903 Pad and by fires in 1957 and 1969. The potential major contaminants are radionuclides. The scope of Operable Unit 3 restoration activities includes the support of the cleanup of low-level radionuclides (plutonium, americium, and uranium).

In FY 1996, the Department will complete and submit the Final Phase I, RCRA Facility Investigation/Remedial Investigation Report and will also prepare and submit a Draft and Final Remedial Investigation Report. Studies are inconclusive, as to the extent of contamination, and the total extent will not be known until the RCRA Facility Investigation/ Remedial Investigation Report is completed. Preliminary evaluation of this operable unit indicates that it is a candidate for no further remedial action.

In FY 1996, the Draft and Final Corrective Measures Study/Feasibility Study Reports will be prepared and submitted to EPA and the Colorado Department of Public Health and Environment for review and approval. At Operable Unit 3, the Department will utilize the site-wide treatability study for actinides in surficial soils to support its feasibility study. In FY 1997, the Final Corrective Measures Study/ Feasibility Study Environmental Assessment Report will be complete. The No Further Action Record of Decision process will be completed in FY 1997.

Operable Unit 4 Activities (Solar Ponds)

Operable Unit 4, the Solar Ponds, contains soil and ground water contaminated as a result of pond leakage during the 1960's and 1970's. Radionuclides, nitrates, metals, and solvents are the potential major contaminants at the unit. Activities planned for Operable Unit 4 include removing water from the ponds, providing a treatment facility to replace the ponds as evaporation-treatment and storage units for pond-related contaminated ground water, removing and disposing of pond sludge in compliance with regulations, assessing the nature and extent of contamination at the ponds, completing a RCRA closure of the impoundments; and remediating the ponds as needed.

The disposal of the pond sludge is currently being planned and negotiated with the regulators. The current proposal is to cover negligibly radioactive and hazardous contaminated soil and liners with an engineered cover (cap). Sludge and pondcrete will also be included under the cap. The five types of restoration activities at Operable Unit 4 include: treatment, storage, and disposal; interim remedial action for water management; interim measure remediation; final action at the Solar Ponds; and project support. The activities in each of the categories are described below.

Activities related to treatment, storage, and disposal include the disposal of pond waste, media, and materials; the selection of technology and design to construct pond waste treatment facilities; the transportation of waste; the maintenance of storage units; and the

development and implementation of permits, procedures, and plans related to operation, partial closure, and document preparation to ensure compliant operations. A scoping report has begun and could allow for treatment and early disposal of low-level waste to an offsite waste disposal facility.

The objective of remediation for water management is to treat all trench and pond water. Activities in the Interim Remedial Action for Water Management include choosing, designing, and installing facilities to store and treat water from the Solar Ponds and from the Interceptor Trench System to collect contaminated ground water downgradient from the ponds. Funding for these activities will provide for the reuse of treated water as a substitute for commercial raw water in the Rocky Flats utilities system.

The Interim Measure Interim Remedial Action Decision Document will implement the treatment system, procedures, and plans related to operation and partial closure, and it will contain other documents as necessary to ensure compliant operation. Funding will support the ongoing, routine operation of the dedicated water treatment facility and supporting operations.

The Interim Measure Remediation involves closing the Solar Ponds in compliance with RCRA and DOE requirements. This includes assessment and remediation activities. The assessment includes environmental investigations, analyses, evaluations, and documentation of the nature and extent of source and soil contamination. The remediation includes selection, design, and implementation of the partial-closure remedy chosen by the agencies. The closure remedy is likely to be a combination of clean-partial closure, capping waste, and environmental media in compliance with State of Colorado requirements, and post-partial closure monitoring. The Final Phase I Interim Measure Interim Remedial Action Decision Document will be complete in FY 1995.

Final Action at the Solar Ponds involves assessment and remediation activities. The assessment includes environmental investigations, analyses, evaluations, and documentation of the nature and extent of contamination. The remediation includes selection and implementation of the appropriatetechnical approach. The Work Plan for these activities will be completed in FY 1998.

Project support activities include data collection, analysis, reporting, regulatory analysis, and other activities required to manage the Solar Ponds.

Operable Unit 5 Activities (Surface Water)

Soil and ground water in Operable Unit 5, the Woman Creek Drainage area, have been contaminated by contact with general plant waste, ash from the burning of depleted uranium, and surface-water runoff that occurred from the 1950's to the 1970's. The potential major contaminants at the unit include uranium, metals, solvents, pesticides, polychlorinated biphenyls (PCBs), and other organic compounds.

The scope of Operable Unit 5 remediation activities involves the cleanup of soils containing uranium, metals, and organics (leachate containing beryllium). It is assumed the original landfill will be covered or capped. The remedy may also involve a "leachate" collection system to ensure the stability and integrity of the cover over time. Any required treatment of collected leachate will likely be conducted at an existing site treatment system. In FY 1996, remedial investigation activities involve completing and submitting the Final Phase I RCRA Facility Investigation/Remedial Investigation Report to the regulatory agencies.

The primary activities of the Corrective Measures Study/Feasibility Study in FY 1995 are to prepare, submit, and finalize the Draft Corrective Measures Study/Feasibility Study Report. The Corrective Action Decision/Record of Decision will be finalized in FY 1998. The Safety Analysis Report will be completed in FY 1999, providing full documentation and complete self-auditing of design before construction commences.

Under remedial action construction, pre-construction activities will be procured and subcontracted during FY 1998. In FY 1998, Rocky Flats will begin construction of a landfill cap.

Activities included in performance monitoring are the monitoring of remediation operations and the provision of performance documentation as required by EPA and DOE directives. Performance monitoring at this unit begins in FY 2000 and continues for 30 years. Project support activities include analysis, reporting, regulatory analysis, and other activities required to manage the Woman Creek priority drainage.

Operable Unit 6 Activities (Surface Water)

Operable Unit 6, the Walnut Creek Drainage area, contains sediments, soils, and ground water contaminated from the 1950's to the 1970's by materials from detention ponds, spray fields, sludge disposal areas, and soil dump areas. Radionuclides, metals, volatile organic compounds, and PCBs comprise the potential major contaminants at the unit. The scope of this remediation in Operable Unit 6, the Walnut Creek area, involves supporting the cleanup of pond sediments containing radionuclides, PCBs, and volatile organic compounds.

In the remedial investigation activities area, the Department will complete and submit the Final Phase I RCRA Facility Investigation/Remedial Investigation Report to the regulatory agencies in FY 1996.

The primary activities of the Corrective Measures Study/Feasibility Study in FY 1996 are to prepare, submit, and finalize the Draft Corrective Measures Study/Feasibility Study Report. In FY 1998, a No Further Action Record of Decision will be completed.

Performance monitoring activities include monitoring the remediation operations and providing performance documentation as required by EPA and DOE directives. Activities in the project support category include analysis, reporting, regulatory analysis, and other activities required to manage the Walnut Creek priority drainage.

Operable Unit 7 Activities (Landfill)

The ground water, surface water, and soils at Operable Unit 7, the Present Landfill, were contaminated by tritium and hazardous waste disposal. The potential major contaminants at the unit are metals, radionuclides, and organic compounds. The scope of Operable Unit 7 involves the support of the cleanup of volatile organic compounds, metals, radionuclides, and asbestos. Field work will confirm the nature, extent, and risk from potential contaminants at this unit.

Under the interim measure decision category, the Department will receive approval by the regulatory agencies in FY 1996 to construct and operate the Interim Measure via approval of the Interim Measure Decision Document. The tasks under this activity include the Conceptual Design, Title I Design, Title II Design, and Title III Design for closure of the landfill.

Performance monitoring includes monitoring of the remediation operations and provides documentation of the performance as required by EPA and DOE directives.

The Final Action Plan includes preparation of the Final Action Plan for review and approval by the regulatory agencies. The Final Action Plan will describe the final action to be undertaken for remediation of the RCRA site. The final action will include post-closure care of the landfill. Under the final action decision, the Department will obtain an approved Final Action Plan on the final action from the regulatory agencies. Final action engineering includes preparation of postclosure care design documents for the final action, including process diagrams, cost estimates, and a draft construction schedule. The documents will be submitted to the regulatory agencies for comments and approval. Final construction will be completed according to approved design documents, on schedule, and on budget in accordance with the interagency group schedule. Project support activities include data collection, analysis, and reporting; regulatory analysis; and other activities required to manage the present landfill.

Operable Unit 11 Activities (Spray Fields)

Operable Unit 11, the West Spray Field, contains soils and ground water that have been contaminated by sprayed application of Solar Pond water. Potential contaminants identified consist of primarily nitrates, but also metals, inorganics, radionuclides, and sewage effluent. The scope of Operable Unit 11 will likely be reduced to activities required to complete a justification for no further action.

The initial phase of the RCRA Facility Investigation investigated the nature and extent of contamination within the source and soils. The next phase investigated the nature and extent of contamination from Operable Unit 11 that may have migrated outside the boundaries of the West Spray Field. The Phase I risk assessment evaluated only risk from the upward pathways (i.e., exposure from air transport or direct contact). Phase II looks at exposure from contaminated ground water or surface water. The combined phases approach will provide a focused, streamlined investigation that will allow the early evaluation of risk of contamination from all pathways. The RCRA Facility Investigation/Remedial Investigation will support a No Further Action Justification Document for Operable Unit 11.

In FY 1995, the Department will first develop and submit a Draft Proposed Plan in accordance with the requirements and schedules set forth in the Statement of Work and then submit a final Proposed Plan for public comment in accordance with Section 117 of CERCLA.

Project support activities include data collection, analysis, and reporting; regulatory analysis; and other activities required to manage the West Spray Field.

Operable Unit 15 Activities (Plant Areas/Facilities)

Operable Unit 15, the Inside Building Closures, contains surface soils and concrete potentially contaminated by the release of hazardous constituents. Solvents, beryllium, and uranium are the potential major contaminants at the unit. Only one release has been documented in Operable Unit 15, and the aim of the restoration activities is to determine whether contamination is present in the area.

During FY 1995, the Final Phase I RCRA Facility Investigation/Remedial Investigation Report will be completed. The draft and final Corrective Action Decision/Record of Decision is scheduled for completion in FY 1997. Performance monitoring activities include monitoring of the remediation operations and

providing documentation of the performance as required by EPA and DOE directives. Project support activities include data collection, analysis, and reporting; regulatory analysis; and other activities required to manage the Inside Building Closures.

Operable Unit 16 Activities (Plant Areas/Facilities)

Operable Unit 16, the Low Priority Sites, include insignificant historical sources of contamination, and no significant potential contaminants. Operable Unit 16 includes miscellaneous leak and waste treatment sites considered the least likely to cause health or environmental problems. The soils at these sites may have been contaminated by organics, solvents, and nickel carbonyl. The only facility included in this operable unit is portions of Building 707. Building 707 was a production facility where foundry, machining, and assembly operations took place. A Final No Further Action Justification Document was submitted in 1992. The document provides technical justification for no additional investigation or remediation at the seven contaminated sites.

The Colorado Department of Public Health and the Environment granted approval of the justification document in 1993. The following activities, which fall under the categories of records of decision and project support, are necessary to close out the operable unit administratively.

Upon approval of the proposed plan and after public comment (comment period ended in January 1994), a record of decision was prepared and submitted to the regulatory agencies in 1994. EPA and the Colorado Department of Public Health approved the record of decision in the first quarter of FY 1995. Project support activities include data collection, analysis, and reporting; regulatory analysis; and other activities required to manage the Low-Priority Sites.

Industrial Area Activities (Plant Areas/Facilities)

The Industrial Area at Rocky Flats consists of Operable Units 8, 9, 10, 12, 13, and 14. All of these operable units are being investigated together due to their proximity to each other. In this area, surface soils, ground water, fiberglassing areas, cooling tower ponds, and burn pits are contaminated, and asphalt and concrete have been contaminated by multiple solvent spills. Acid leaks, waste spills, fuel tank spills, lithium metal destruction, and leaking drums, pipes, and storage tanks are among the sources of contamination. Potential major contaminants at the unit are radionuclides, acids, solvents, caustics, metals, and organic compounds. Ninety-five individual contaminated sites comprise the Industrial Area. Eleven of these sites will likely be reduced to activities required to complete a No Further Action Justification Document in FY 1995. Thirty-nine of the sites have the potential for early actions during FY 1998 and FY 1999, and 45 sites will be investigated through the deactivation, decontamination, decommissioning, and demolition remedial investigation/feasibility study process.

Activities under limited field investigations include surficial gamma radiation surveys, surficial soil sampling, vertical profile sampling, ground-water monitoring, soil gas sampling, soil borings and subsurface sampling, and tank residue sampling and inspection. The potential for early actions/no further actions include tank removals in progress at Operable Units 8 and 10. Additional tank removals are in the planning stage for Operable Units 8 and 9.

RCRA Facilities Investigation/Remedial Investigation fieldwork activities are in progress. Project support activities include data collection, analysis, and reporting; regulatory analysis; and other activities required to manage the Industrial Area operable units. Nonintrusive field work has been completed in all Industrial Area operable units except Operable Unit 8. Some intrusive field work is being deferred until decommissioning activities are complete.

Treatment, Storage, and Disposal

The remediation of the Rocky Flats site's 16 operable units will generate a variety of waste contaminated with both hazardous and radioactive constituents, including waste derived from investigative activities (i.e., drill cuttings and purge water) and waste generated from operable unit cleanup activities (i.e.,

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Hillside 881							
Assessment	470	0	0	0	0	0	0
Remedial Actions	1,336	1,062	1,222	569	581	164	164
Surveillance And Maintenance	0	0	0	0	850	1,062	1,062
903 Pad & East Trenches							
Assessment	7,208	0	0	0	0	0	0
Remedial Actions	5,235	4,204	670	1,405	2,300	655	655
Surveillance And Maintenance	0	0	4,204	4,205	4,205	4,205	4,205
Facility Decommissioning							
Assessment	4,839	5,273	7,200	8,936	7,686	25,647	15,628
Surveillance And Maintenance	0	0	0	0	807	884	1,651
Facility Decommissioning	18,988	18,456	29,959	46,244	47,915	110,765	175,698
Landfill							
Assessment	416	0	0	0	0	0	0
Remedial Actions	3,045	0	69	133	133	96	96
Surveillance And Maintenance	0	447	459	395	504	643	590
Offsite Projects							
Assessment	1,062	0	0	0	0	0	0
Plant Areas/Facilities							
Assessment	20,185	6,089	1,874	0	0	0	0
Remedial Actions	5,262	13,375	11,655	12,441	11,346	2,928	2,928
Surveillance And Maintenance	289	97	7,790	10,692	14,627	15,981	15,936
Program Management							
Assessment	21,787	21,917	21,917	21,917	21,917	21,917	21,917
Rocky Flats Treatment/Storage/Disposal							
Environmental Restoration T/S/D	28,618	11,937	16,687	22,194	28,570	28,194	28,194
Solar Pond							
Assessment	2,155	0	317	665	1,088	310	310
Remedial Actions	26,550	0	0	0	0	0	0
Surveillance And Maintenance	0	1,988	1,988	1,988	1,988	1,988	1,988
Spray Fields							
Assessment	419	0	0	0	0	0	0
Surface Water							
Assessment	2,672	0	0	0	0	0	0
Remedial Actions	11,179	235	0	0	91	91	91
Surveillance And Maintenance	107	653	653	646	646	646	523
Total	161,824	85,733	106,664	132,431	145,253	216,177	271,635

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

Environmental Restoration Activity Costs (contd.)

	*Five-Year Averages (Thousands of Constant 1995 Dollars)**							
	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Hillside 881								
Assessment	0	0	0	0	0	0	0	2,820
Remedial Actions	164	164	164	164	984	0	0	35,040
Surveillance And Maintenance	1,062	0	0	0	0	0	0	20,175
903 Pad & East Trenches								
Assessment	0	0	0	0	0	0	0	43,250
Remedial Actions	655	655	655	655	3,930	0	0	113,619
Surveillance And Maintenance	0	0	0	0	0	0	0	105,116
Facility Decommissioning								
Assessment	0	0	0	0	0	0	0	380,884
Surveillance And Maintenance	3,258	4,784	5,888	8,783	2,638	258	0	144,754
Facility Decommissioning	221,00D	225,896	350,000	328,809	431,094	173,953	0	10,912,877
Landfill								
Assessment	0	0	0	0	0	0	0	2,493
Remedial Actions	96	96	96	96	576	0	0	25,684
Surveillance And Maintenance	0	0	0	0	0	0	0	15,185
Offsite Projects								
Assessment	0	0	0	0	0	0	0	6,374
Plant Areas/Facilities								
Assessment	0	0	0	0	0	0	0	160,923
Remedial Actions	2,928	2,928	2,928	2,928	17,568	0	0	451,341
Surveillance And Maintenance	7,421	0	0	0	0	0	0	364,461
Program Management								
Assessment	0	0	0	0	0	0	0	788,233
Rocky Flats Treatment/Storage/Disposal								
Environmental Restoration T/S/D	142,465	102,465	107,465	105,809	0	0	0	3,141,598
Solar Pond								
Assessment	310	310	310	310	1,860	0	0	41,867
Remedial Actions	0	0	0	0	0	0	0	159,300
Surveillance And Maintenance	0	D	0	0	0	0	0	59,648
Spray Fields								
Assessment	0	0	0	0	0	0	0	2,511
Surface Water								
Assessment	0	0	0	0	0	0	0	16,033
Remedial Actions	91	91	91	91	540	0	0	74,134
Surveillance And Maintenance	0	0	0	0	0	0	0	19,484
Total	379,450	337,389	467,596	447,645	459,190	174,211	0	17,087,804

* *Costs reflect e five-year average in constant 1995 dollars, except in FY 1995-2000, which is e six-yeer everege.*

** *Total Life Cycle is the sum of ennual costs in constent 1995 dollars.*

contaminated soils and pond sludge). Many of these remediation activities will generate secondary waste streams requiring follow-up treatment, storage, and disposal.

Contaminated media from the operable units will be transported to treatment facilities, which will have the capability to treat contaminated soils, surface water, and ground water. The nature, number, and siting of these activities will be determined as requirements and needs are defined in the RCRA Facilities Investigation/Remedial Investigation plans, feasibility studies, and corrective action decisions/records of decision of the various operable units.

Handling facilities for storage will be necessary until environmental restoration-generated waste can be characterized and final disposition can be accomplished. Additional waste handling and storage requirements may be identified in the course of RCRA Facilities

Investigation/Remedial Investigation fieldwork at the various operable units. RCRA permits will be required for any new waste storage facilities.

Currently, the design and construction of the treatment, storage, and disposal facilities are being planned. These facilities include a soil washing facility, site-wide treatment facility, decontamination pad upgrades, an interim bulk storage facility (in FY 1995 through FY 1997), an investigation derived material storage facility in FY 1995, and a pre-filtration facility.

The FY 1995 through FY 2020 waste disposal costs included in the environmental restoration cost estimate are for Operable Unit 4 only. All other environmental restoration activities assumed environmental restoration waste will be delivered to onsite waste management facilities for subsequent treatment, storage, and disposal. These subsequent treatment, storage, and disposal costs are not included in either the environmental restoration or waste management cost estimate for this period. Disposal costs for the soil excavated from underneath buildings were not included in the cost forecasts because it is assumed this soil will be treated, if appropriate, and returned to the excavation site. Offsite disposal will not be necessary. The FY 2020 through FY 2055 disposal costs excluding costs for transuranic waste have been estimated.

Decommissioning

Decommissioning activities include equipment removal and other activities necessary to release plutonium, nonplutonium, and support buildings for decommissioning and dismantlement. Deactivation activities are described in the Nuclear Material and Facility Stabilization section below. The projected disposition of the site consists of variable land use conditions. The Protection Area and the Industrial Area are assumed to be cleaned up to industrial use standards and to remain under permanent institutional control. The Buffer Zone is assumed to be cleaned up to variable, although primarily, recreational use standards. Water control ponds located in the buffer zone are assumed not to be remediated to an open space or recreational land use condition.

The major activities needed to complete the decommissioning process include facility-specific management, surveillance and maintenance, characterization, environmental safety and health, engineering, internal decommissioning operations, structural decommissioning operations, subgrade decommissioning operations, and close-out and verification.

Major Waste Management Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Building 374 Liquid Waste Treatment	12,033	9,020	8,760	8,540	8,360	5,360	0	272,400
Building 774 Treatment (Sludge Immobilization)	1,133	1,260	0	0	0	0	0	13,100
Comprehensive Treatment Mangement Plan System	4,650	10,700	2,940	0	0	0	0	96,100

* *Costs reflect e five-yeer everege in constent 1995 dollers, except in FY 1995-2000, which is e six-yeer average.*

** *Totel Life Cycle is the sum of annuel costs in constant 1995 dollars.*

Note: These projects represent e subset of weste menegement ectivities. Associeted progrem menegement costs ere built-in to the estimates provided.

Environmental Restoration Program Management and Miscellaneous

Program management support activities include planning, control, reporting, coordination, and oversight for environmental restoration activities; administrative support; administrative record; NEPA documentation related to RCRA; interagency group renegotiations; safety and health assessment; maintenance of the Rocky Flats Environmental Data Base System; quality assurance; and community relations.

Cost Estimate

The cost estimate for the environmental restoration activities (summarized in Table 2 and detailed in Table 9) is based on direct remediation costs, including engineering design, inspection, assessment, characterization, construction, and project management costs.

WASTE MANAGEMENT

The goal of the Rocky Flats waste management program is to reduce, eliminate, or mitigate environmental liabilities by managing waste safely and effectively. There are four primary sources of waste: (1) existing inventories from past generation, (2) waste from environmental restoration/decontamination and decommissioning activities, (3) waste from facility stabilization and maintenance activities, and (4) materials generated by waste management and treatment activities.

Nine types of waste are generated and/or stored at Rocky Flats. This waste includes residues, mixed residues, transuranic waste, transuranic-mixed waste, low-level waste, low-level mixed waste, hazardous waste, other regulated waste, and sanitary waste.

In general, management of waste follows a three-step process: treatment, storage, and disposal. This process is not necessarily sequential for all waste streams. For example, a waste type may need to be treated before and after storage to comply with both storage and disposal waste acceptance criteria. Another waste type may not need to be treated or stored but can be sent directly to disposal after generation.

Waste Treatment

The objective of waste treatment is to process and package for disposal the solid and liquid waste generated at Rocky Flats. Waste-treatment costs encompass both existing and planned treatment systems, as well as surveillance and maintenance of the major waste treatment facilities.

Waste management activities will provide treatment of the secondary waste streams, and the storage and disposal of both primary and secondary restoration wastes. The cost estimate for this document does include the treatment of the secondary waste.

Existing Treatment Operations

Rocky Flats has several waste treatment facilities to process and package liquid and solid waste generated at the site for safe storage, transport, and disposal. There are five existing treatment facilities: Building 374, Building 774, Buildings 776/777, and the Sewage Treatment Plant (Building 995). These facilities represent the key treatment operations at the Rocky Flats.

Building 374 is used for treatment of chemically contaminated radioactive and nonradioactive aqueous wastewater from process, laboratory, and utility buildings throughout the site. The largest sources of water treated in this building are laundry and incidental waters (e.g., solar pond water, runoff, and various building drain systems), which account for half of the

approximately 14 million gallons of water processed in Building 374 annually. Liquid waste processed in Building 374 is converted into solid waste (saltcrete), and distilled water used by site utilities in boilers and cooling towers. Costs associated with Building 374 liquid waste treatment activities include capital improvements to the evaporator system, the building maintenance and surveillance, and facility upgrades.

The facilities in Building 774 are used for treatment of transuranic-mixed, low-level mixed, and organic liquid waste forms. Waste treated in Building 774 includes liquid waste from Building 774 (i.e., water from ground-water accumulation systems, decontamination showers, utility systems, and nonproduction systems); miscellaneous solutions from Building 559, 371, 771, and 779; and any organic liquid waste from Buildings 707, 776, and 777. The Bottle Box operation located in Building 774 is used for solidification of laboratory waste and the stabilization of liquid residues.

Building 776 processing includes repackaging waste combustibles, metal, glass, and large high-efficiency particulate air filters in the Size Reduction Vault; adding cement to immobilize moisture in waste filter media, insulation, and glovebox filters in the Size Reduction Vault; and size-reducing large items or equipment, machinery, and gloveboxes in the Advanced Size Reduction Facility. This facility is currently nonoperational, but soft combustible material, glass, and light metal waste can be compacted in the Supercompaction and Repackaging Facility. Building 777, which is contiguous with Building 776, houses several RCRA storage units.

Building 889 was used for the volume reduction and packaging of uranium-contaminated equipment and other low-level and low-level mixed waste generated outside the Protected Area. This facility has not been operational for several years and has been turned over for decommissioning.

The Sewage Treatment Plant is used for treatment of liquid sanitary waste produced at Rocky Flats, including wastewater generated from sanitary drains located outside the process areas. Liquid sanitary waste is treated in an activated sludge process. The sludge produced is dried and packaged in lined plywood boxes. The water is treated to comply with the terms of the Rocky Flats National Pollutant Discharge Elimination System permit and then pumped to ponds on Walnut Creek. Packaged sludge is currently stored onsite, pending offsite disposal at the Nevada Test Site or Hanford.

Residue management includes not only the management of residues but also the coordination and design of accelerated treatment of selected residues for shipment and disposal. It is estimated these liquid residues will be drained from tanks and pipes, and treatment will be concluded by FY 1999.

Planned Treatment Systems Upgrades

The Comprehensive Treatment and Management Plan, a requirement of the Land Disposal Restricted Federal Facility Compliance Agreement II, outlined a series of steps for onsite treatment of low-level mixed and transuranic-mixed waste, offsite treatment of mixed waste, and/or recharacterization; however, this agreement expired in 1993. A Site Treatment Plan is being developed as required by the Federal Facility Compliance Act of 1992, which contains requirements similar to the Land Disposal Restricted Federal Facility Compliance Agreement II. Pending the completion of the Site Treatment Plan, treatment systems for mixed waste will continue to be developed according to the Land Disposal Restricted Federal Facility Compliance Agreement II.

Funding requests have been initiated for each of the Comprehensive Treatment and Management Plan treatment systems. The treatment systems detailed in the plan will ensure all low-level mixed waste could be treated onsite to meet land disposal restriction

Planned Treatment System Upgrades

Treatment Unit	Planned Upgrade
Comprehensive Treatment and Management Plan System 1A	Destruction of organic contaminants (including PCBs) and volume reduction of combustible mixed waste by thermal treatment.
Comprehensive Treatment and Management Plan System 1B	Destruction of organic contaminants (including PCBs) and volume reduction of combustible mixed waste by nonthermal means such as alkaline chlorination, alcohol-base-driven dechlorination, hot dodecane wash, and oxidation.
Comprehensive Treatment and Management Plan System 2/4B	Immobilization of radionuclides, metals, and low concentrations of organic compounds utilizing one of the following immobilization technologies: cementation, plymer solidification, or microwave solidification. (Note: Waste feeds will consist primarily of inorganic process residues, although the system may include capability to treat some nonmetal debris and other solids.)
Comprehensive Treatment and Management Plan System 3	Immobilization of radionuclides, metals, and low concentrations of organic compounds using cementation or polymer solidification.
Comprehensive Treatment and Management Plan System 4A	Cementation or polymer solidification of radionuclides, metals, and low concentrations of organic compounds present in the nitrate salts generated from water-treatment processes in Building 374.
Comprehensive Treatment and Management Plan System 5	Removal of organic compounds or radioactive contamination from the surfaces of various solid waste types by volatization or cleaning/stripping.
Comprehensive Treatment and Management Plan System 6	Immobilization of sludges and previously solidified process residuals contaminated with metals and low concentrations of organic compounds using cementation or solidification.
Comprehensive Treatment and Management Plan Path F	Treatment by repackaging or immobilization of solid transuranic-mixed waste not meeting Waste Isolation Pilot Plant waste acceptance criteria or transportation requirements.
Building 374 Waste Treatment	Restore operability, improve RCRA compliance, improve safety items, and create additional water storage capacity. Replaces components necessary to reduce equipment failures significantly, ensure safe operation of the facility, and add instruments and data collection equipment to meet RCRA reporting requirements.
Building Treatment Plant	Meet regulatory compliance, including installation of a mechanical de-watering and drying system, improvements to the electrical system, structural rehabilitation to extend the useful life of the sewage treatment plant to 2015, construction and installation of influent/effluent holding tanks, nitrification/denitrification capability, and modifications to the equalization basins.

requirements in the event offsite treatment facilities do not become available and transuranic-mixed waste could be treated onsite to meet transportation requirements and Waste Isolation Pilot Plant waste acceptance criteria. In addition, upgrades to existing treatment systems in Buildings 374 and 774 and the sewage treatment plant are underway. The Comprehensive Treatment and Management Plan systems and planned treatment system upgrades are described as follows. Changes to the Draft Site Treatment Plan are not included here.

These treatment facilities will each operate over 10-year periods. Some of these operations will continue until 2018. Once the initial processing is completed, additional facility lifespans will remain. This capacity may be useful for treatment of the waste streams generated from deactivation, decontamination, and decommissioning activities. Since treatment capacity will be needed until 2055, further evaluation of the facilities will be required.

Residue Strategy

An implementation strategy for solid residues may consist of one or more or a combination of the following paths: ship as waste, ship as residue, or remove actinides at Rocky Flats to minimize waste sent to the Waste Isolation Pilot Plant. Stored liquid residues are being treated either through the Building 774 Bottle Box, the Precipitation Process, or the Building 371 Caustic Waste Treatment Process. Costs for these activities are included in the Waste Management Cost Table.

Waste Regulatory Programs

Waste regulatory programs encompass day-to-day compliance activities, such as inventory, labeling, documentation, staging, storage, inspection, and surveillance of waste containers. About 16,000 cubic yards of hazardous and mixed wastes stored at the site require management according to RCRA. The RCRA Regulatory Program provides preparation of the necessary permit modification applications and changes to interim status, preparation and implementation oversight of active unit closure plans, dissemination of guidance to generators and handlers of hazardous and mixed wastes, management of RCRA training, and legislation reviews. This program also consists of the development and maintenance of regulated-waste compliance documentation and RCRA and Toxic Substances Control Act inspections of RCRA-regulated hazardous waste and PCB container and tank storage facilities.

Waste Certification

The waste certification program supports the independent certification of waste packaging for shipments of radioactive waste to treatment and disposal sites, such as the Nevada Test Site, Hanford, and the Waste Isolation Pilot Plant. Specifically, the activities support the certification of radioactive waste packaging.

Waste Characterization

Waste characterization encompasses waste sampling and analysis, development of analytical methods, and the documentation and verification of site waste streams. Much of the waste generated at Rocky Flats in the past was characterized solely by process knowledge, resulting in overly conservative waste categorization and exacerbating the waste storage problems at the site.

The Backlog Waste Recharacterization effort is one example of the attempts to better characterize these production-era wastes. It is anticipated this effort will be completed in FY 1995, and 10 percent of the hazardous and mixed backlog waste will be reclassified as nonhazardous, nonmixed waste as a result of this process.

Examples of capital equipment projects planned to upgrade instrumentation and methodology in existing laboratory space include a passive-

active drum counter, an anion analyzer, an infrared x-ray spectrometer, and an Inductively Coupled Plasma spectrometer. In addition, analytical instruments critical to waste characterization will need to be installed.

Surveillance and Maintenance of Buildings 664, 776, and 777

Surveillance and maintenance of Buildings 664, 776, and 777 consist of baseline activities designed to maintain compliance with safety requirements, environmental regulations, and waste management requirements. These activities include maintaining facility safety envelopes, periodic surveillance, tracking of vital safety systems, inspection of equipment, corrective and preventative maintenance of facilities and equipment, and management of administrative controls.

Waste Storage

In addition to storage of all waste generated at the site, costs encompass construction and operation of storage facilities, waste regulatory programs, waste certification, waste characterization, and surveillance and maintenance of storage facilities.

Low-level and low-level mixed wastes comprise the majority of waste stored at the site. At present, most of Rocky Flats' waste types must be kept in interim storage pending the permitting or construction of offsite waste disposal sites. This includes the most voluminous waste type, low-level mixed waste. In the meantime, waste is continually generated at a steady rate as necessary baseline operations are performed. Scheduled remediation activities will create increasingly burdensome demands on already burdened storage facilities.

Storage Facility Construction and Operations

There are numerous waste storage facilities at Rocky Flats, and storage operations are expected to increase based on environmental cleanup and other generating activities. In order for cleanup to begin, a significant amount of additional storage capacity must be located and/or constructed onsite.

Several existing buildings will be converted to storage to help meet the storage needs. Also, the construction of a new Centralized Waste Storage Facility will provide 25,000 square feet (3,700 cubic yards) of compliant storage for low-level, low-level mixed, and hazardous waste. Construction of this facility was completed in February 1995, and operations have been initiated.

Waste Disposal

Waste disposal activities include the shipment of saltcrete to Envirocare for processing low-level radioactive waste for shipment to the Nevada Test Site and Hanford; the preparation, transportation, and disposal of hazardous, and other regulated waste by commercial vendors; and the disposal of sanitary waste in the onsite landfill.

Only sanitary waste is disposed of onsite at Rocky Flats. Construction of the first cell of a new sanitary landfill to replace the existing sanitary landfill began in FY 1994. This new landfill will consist of four individual cells and will have a capacity of approximately 611,200 cubic meters to meet Rocky Flats' solid sanitary waste disposal requirements for the next 20 years. Each cell will be equipped with a double-liner system, a leachate collection system, a leak detection system, a methane gas collection system, and a baler system to enhance waste volume reduction and recycling, and will have an estimated operational life of five years.

Hazardous waste is routinely shipped offsite; the initial shipment of low-level saltcrete to Envirocare will take place in FY 1995. Excess chemical inventories will be dispositioned and will not require onsite treatment. For radioactive site waste types, compliant onsite waste storage areas are reaching allowable volume limits, and offsite disposal facilities are not available. Many of the problems associated with waste disposal, such as the availability of offsite disposal facilities, are beyond the control of Rocky Flats. The site can and will aggressively pursue those activities associated with the preparation of waste to meet the projected waste acceptance criteria for offsite disposal facilities.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Transuranic Waste	29,843	34,135	34,135	34,135	34,135	34,951	37,688
Low-Level Mixed Waste	23,400	52,848	52,848	52,848	52,848	43,411	4,532
Low-Level Waste	38,299	39,356	39,356	39,356	39,356	39,356	31,784
Storage and Handling							
Transuranic Waste	28,564	45,151	14,819	14,814	14,814	16,496	19,546
Low-Level Mixed Waste	54,777	53,099	53,027	53,027	53,027	43,054	2,530
Low-Level Waste	19,212	23,836	24,294	24,030	24,081	24,524	21,402
Hazardous Waste	3,547	5,414	5,694	4,731	3,645	3,647	3,645
Sanitary Waste	1,362	1,399	1,399	1,399	1,399	1,399	1,399
Other	29,091	29,893	29,893	29,893	29,893	29,893	29,893
Total	228,094	285,131	255,465	254,233	253,197	236,731	152,419

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Transuranic Waste	28,795	1,351	0	0	0	0	0	1,375,672
Low-Level Mixed Waste	0	0	0	0	0	0	0	1,437,067
Low-Level Waste	1,199	0	0	0	0	0	0	1,378,609
Storage and Handling								
Transuranic Waste	4,057	739	59	0	0	0	0	823,862
Low-Level Mixed Waste	0	0	0	0	0	0	0	1,617,470
Low-Level Waste	4,165	23	0	0	0	0	0	847,057
Hazardous Waste	3,645	3,645	3,649	3,649	3,649	0	0	246,350
Sanitary Waste	1,399	1,399	1,399	1,399	1,399	0	0	85,139
Other	29,893	29,893	29,893	29,893	23,914	0	0	1,788,771
Total	73,153	37,051	35,000	34,942	28,963	0	0	9,599,996

* Costs reflact a five-yaar everage in constent 1995 dollars, except in FY 1995 - 2000, which is e six-yaar average.

** Total Life Cycla is the sum of annual costs in constant 1995 dollers.

Waste Management Cost Estimate

The cost estimate for the waste management program includes the storage, treatment, and disposal of existing waste inventories as well as future waste to be generated by routine operations of the site, including environmental restoration, and nuclear material and facility stabilization activities. Costs for waste minimization activities are included in the Program Management Cost table.

Currently, a substantial amount of storage at Rocky Flats is associated with the use of available storage space in plutonium operations buildings located in the Protected Area. Operations within plutonium buildings require substantial indirect support in the form of health and safety, safeguards, and security requirements. The costs related to storage in these buildings are driven upwards by the indirect costs associated with using the plutonium buildings.

In addition, the presence of mixed radioactive wastes dictate regulatory inspection and monitoring requirements be met. These requirements include RCRA and other environmental laws, orders, and agreements. The State of Colorado and EPA require daily and monthly inspections of mixed waste storage areas and various waste sampling, analysis, and characterization activities. These compliance actions also increase the direct and indirect costs of waste storage at the site.

There will be a need to operate existing facilities during the post-2020 period. As the backlog of existing waste is eliminated, new waste generated by restoration activities will take its place. Also, operation of existing storage areas will be needed to stage and prepare for shipments and to respond to fluctuations in shipping rates. The operation costs for existing storage facilities in the post-2020 period have been included.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

Facility stabilization, maintenance, and monitoring involves the management of EM facilities until their ultimate disposition is determined and achieved. Site facilities include chemical processing plants and buildings contaminated with radiological and hazardous materials. The major activities for the site under this category are facility operations, surveillance and maintenance, stabilization of facilities, and consolidation and storage of special nuclear materials.

Operations, Surveillance and Maintenance

The largest contributor to the annual cost of facility operations has been the cost of safely operating and maintaining the 19 buildings storing or handling radioactive and other hazardous materials. These buildings were originally used for manufacturing processes and were designed to allow safe work on fissile materials or other radioactive materials. After being placed in service, these facilities were constantly operated, monitored, and maintained to ensure public, environmental, and worker safety.

Several buildings have been in service for almost 40 years. Older buildings have higher maintenance requirements and upgrades to ensure ongoing safety. Operation and surveillance and maintenance activities are recurring activities continuing until the buildings are decommissioned or turned over for commercial reuse.

Buildings awaiting shutdown remain staffed to accomplish building baseline activities. Building baseline activities are designed to maintain compliance with operational safety requirements, environmental regulations, and waste management requirements. Also

included are activities to meet radiological requirements, criticality safety requirements, industrial safety requirements, and fire codes. Management, operations, facility-specific training, and maintenance activities are all aimed at supporting compliance with these requirements and providing general building support in the areas of health and safety operations; nuclear safety; technical, administrative, and custodial support; utility services; and waste management activities.

Stabilization and Material

Stabilization of facilities include solid and liquid stabilization; stabilization of equipment, systems, or facilities; and plutonium repackaging and stabilization. These high-priority activities are necessary to place materials in a stable configuration for safe storage and management, and to begin the process of deactivating facilities.

Currently there remains approximately 30 cubic meters of actinide solutions stored in tanks, pipes, and bottles primarily in Buildings 371 and 771. These liquids remain in the same mid-process locations and configurations they were in when production was halted in 1989. These radioactive solutions present a liability due to the slow, long-term degradation of their containers. Additionally, the plutonium in the solutions can precipitate out over time and collect in the bottom of tanks and piping, complicating safety and removal.

To reduce the risk, the solutions are being converted to solids and then stored and managed as waste or special nuclear material depending on their plutonium concentration levels. In addition, the solutions need to be removed from the tanks and piping to facilitate RCRA closure, which is a key initial step in the decontamination of Building 771. The liquid stabilization program (RCRA closure) is expected to be completed by FY 2003.

In 1990, plutonium operations were halted. Some glovebox exhaust systems contained more than recommended levels of fissile material. Some of these ducts have been remediated, while others have been evaluated to show they do not pose any significant hazard in their present condition. Ducts will be evaluated to establish their safe condition, and then will be removed and dispositioned during decommissioning of each building. In the meantime, safety evaluations will identify the necessary conditions and controls required to maintain the duct material in a safe configuration. The remaining solid stabilization activities are discussed in the section below.

Stabilization activities are required for surplus buildings, equipment, systems, modules, and other ancillary structures. Examples of activities performed during stabilization are removal of chemicals, removal of spent nuclear material, de-energizing electrical and pressure sources, isolating and/or removing gloveboxes, and process-line draining and isolation.

The removal of materials, system configuration changes, and level of encapsulation will be determined by the scope of the requested deactivation. Plans are in various stages. For example, planning is under way to deactivate two modules in Building 707. Additional areas identified for deactivation include rooms in Building 779 and 886 and all of Building 889. These areas are being planned in conjunction with decommissioning activities.

Special Nuclear Material Consolidation and Storage

Currently, Rocky Flats has over 14 tons of plutonium, including special nuclear material, stored in 22 vaults and vault-type rooms located within 8 buildings in a highly protected portion of the Industrial Area called the Protected Area. The special nuclear material is in various physical and chemical forms and is

contained in a variety of packaging and containers. The large presence of this material poses potential risks to health and safety due to its toxicity if it is inhaled or ingested by humans or animals. The solid material inventory remains primarily in temporary packaging, which will eventually show signs of degradation.

In some of the packages, plutonium is in contact with plastic, which is subject to radiation damage and may eventually compromise the integrity of containment. The metallic portion of the inventory is subject to oxidization, and some of the oxides formed are unstable and pyrophoric. As the packaging continues to age, the potential for release of package contents increases. Therefore, it is necessary to stabilize and upgrade the packaging and storage configuration.

Plutonium residues, both liquid and solid, will be completely repackaged, treated, stored, and shipped, allowing key plutonium processing buildings to be stabilized. Ventilation of solid residues should be completed by FY 1998, with treatment of solid residues beginning by FY 2003 and scheduled for completion by FY 2011. Liquid stabilization is scheduled for completion in Building 371 by FY 2001 and for Building 771 by FY 2003. All residues are planned for shipment to the Waste Isolation Pilot Plant by FY 2020. Current plans as of March 1995 is to accelerate this schedule consistent with the recommendation of the Defense Nuclear Facility Safety Board.

The thermal stabilization activities will reduce pyrophoricity and remove contaminants to render the plutonium material safe for storage. Thermal stabilization will be complete in FY 2000 and will involve several processes. The 700 area plutonium will be thermally stabilized at 500°C pending the verification of another furnace to operate at 800°C. Then, the remaining material, except Building 371 oxides, will be stabilized using the 800° furnace. After a 1,000°C furnace is operational in Building 371, the 700 area oxides will be re-stabilized along with the stabilization of the Building 371 oxides.

Long-term interim storage of plutonium onsite is necessary until a national DOE decision on an ultimate long-term storage location is reached. However, the current storage containers onsite were never intended for long-term storage and therefore, a new storage container must be designed.

Special nuclear material will be consolidated into Building 371 by FY 2000 pending offsite shipment. Shipment of special nuclear material is planned by FY 2007, with removal of the

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	154,052	58,050	271,316	4,920	277	230	11	2,598,336

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

material completed by FY 2020. To consolidate the special nuclear material, building modifications must be completed in Building 371 in addition to shipping more than 2,000 items to Oak Ridge, Savannah River, and the Los Alamos National Laboratory. Special nuclear material will no longer be located at the Rocky Flats. Packaging of special nuclear material for long-term storage will be completed by 2002. In addition, consolidation of special nuclear material will reduce annual operating costs by reducing safeguards and security costs in various facilities.

LANDLORD FUNCTIONS

Beginning in FY 1994, landlord responsibility for Rocky Flats was transferred from the Assistant Secretary for Defense Programs to the Assistant Secretary for Environmental Management. Landlord responsibility, which has been assumed by the Office of Nuclear Material and Facility Transition, includes certain site-wide activities not assigned to direct site programs. The segregation of activities to the landlord and infrastructure category follows DOE Headquarters guidance on funding sources. The landlord and infrastructure activities support the direct programs.

The landlord activities cover a wide range of site functions required for maintaining the infrastructure at the site. Some examples of these types of functions are described below.

Environmental Monitoring

Environmental monitoring includes air monitoring and assessment; chemical tracking and reporting; surface-water monitoring and assessment; ground-water monitoring and seismic monitoring; and monitoring ecology and the National Environmental Protection Act requirements for biological flora and fauna assessment and protection along with environmental impact mitigation planning and documentation. In addition to monitoring, numerous reporting activities are ongoing to maintain compliance with environmental regulations.

Building Upgrades and Refurbishment

Maintaining the infrastructure requires many types of refurbishments, replacements, and upgrades. Due to the aging facilities, projects must be completed to replace electrical, mechanical, or other infrastructure systems. Included in these projects are the upgrades to the central steam plant to be completed in FY 1995, replacement of the main site substation to be completed in FY 1998, and the replacement of specific portions of the plutonium heating, ventilation, and air conditioning system.

In addition to replacing these systems, a project is underway to upgrade, replace, or close RCRA-regulated underground storage tanks to meet current performance standards. This project will be completed in FY 1999.

Fire Security Replacement Project

The fire/security system will be replaced by FY 2000 to provide a new security alarm, fire area, and security requirements change due to the site's new mission.

Safeguards and Security

Another important landlord responsibility is to provide safeguards and security for the protection of spent nuclear material and site personnel. Several projects are scheduled to

ensure continuing success in this area. A replacement of the plant alarm/warning notification system will be completed in FY 2000.

The Master Safeguards and Security Agreement requires projects of varying sizes to be completed in order to protect special nuclear material adequately. These projects are found in multiple buildings and provide multiple types of equipment to provide better security. Examples of these projects are the upgrading of perimeter intrusion equipment and the provision of a glovebox line to consolidate plutonium handling.

Health and Safety

Health and safety encompasses nuclear safety, emergency management, industrial hygiene, occupational safety, and radiation protection.

Additionally, there are several capital projects planned to upgrade the site. These include new equipment, air monitoring improvements, and health physics improvements. New equipment such as an alpha spectroscopy analysis system and an emergency body counter are needed to ensure the ongoing success of radiological protection. Air monitoring improvements include a representative effluent sampler

Landlord Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Directly Appropriated Landlord	113,980	81,320	81,320	81,320	81,320	12,467	12,467

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Directly Appropriated Landlord	12,467	12,467	12,467	12,467	12,467	9,974	0	2,796,494

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	40,015	33,951	38,135	44,517	43,731	73,103	79,664

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Program Management	71,995	71,282	108,389	102,028	138,717	52,186	0	4,528,573

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

system and ambient air particulate sampler system. Both of these systems are required to meet current compliance with standards for radionuclide air monitoring. In addition, replacing two alarm monitoring systems in plutonium processing and support buildings will meet current requirements for airborne alpha-radiation monitoring.

PROGRAM MANAGEMENT

Program management at Rocky Flats provides payments and grants to the State of Colorado, DOE Subcontractor Support, and Waste Minimization.

Agreement-In-Principle

The Agreement-In-Principle was executed in 1989 between DOE and Colorado Department of Public Health and Environment. In this agreement, the Department committed to an expanded environmental monitoring program, an acceleration of cleanup activities at some contaminated sites, several initiatives for achieving a more comprehensive environmental management system, an enhanced emergency response, and allocation of additional funds to the State of Colorado to administer oversight programs at the site. Annual payments to the State for these activities began in 1990 and will continue indefinitely.

DOE Subcontractor Support

DOE Rocky Flats Field Office has subcontracted support to assist in oversight of the operating contractor in the area of waste and environmental compliance. This support is expected to continue at some level throughout the life of the Environmental Management program.

Waste Minimization/Pollution Prevention

The Waste Minimization/Pollution Prevention Program includes the programmatic and administrative functions necessary for a fully compliant Waste Minimization/Pollution Prevention Program at the site. The objectives of this program are to reduce the volume and toxicity of all site waste streams through source reduction, recycling, reuse, and reclamation. This category includes costs for coordinating site-wide nongenerator-specific Waste Minimization/Pollution Prevention and includes planning and regulatory reporting, employee training and awareness programs, site-wide assessments and technical assistance, technology and information exchange, and community involvement.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Rocky Flats.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	0	0	0	4,642	0	11	11	23,319

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	161,824	85,733	106,664	132,431	145,253	216,177	271,635
Waste Management	228,094	285,131	255,465	254,233	253,197	236,731	152,419
Nuclear Material and Facility Stabilization	154,052	58,050	271,316	278	277	219	0
Directly Appropriated Landlord	113,980	81,320	81,320	81,320	81,320	12,467	12,467
Program Management	40,015	33,951	38,135	44,517	43,731	73,103	79,664
Total	697,965	544,186	752,899	512,778	523,778	538,697	516,185

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	379,450	337,389	467,596	447,645	459,190	174,211	0	17,087,804
Waste Management	73,153	37,051	35,000	34,942	28,963	0	0	9,599,996
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	2,575,017
Oirectly Appropriated Landlord	12,467	12,467	12,467	12,467	12,467	9,974	0	2,796,494
Program Management	71,995	71,282	108,389	102,028	138,717	52,186	0	4,528,573
Total	537,065	458,188	623,452	597,082	639,337	236,371	0	36,587,884

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Submit Final CAD/ROD for OU 1	1996
	Complete Assessment Phase--OU 1	1995
	Complete Remediatian Phase--OU 1	2015
	Complete Surveillance and Maintenance--OU 1	2055
	Complete Assessment Phase--OU 2	2000
	Complete Remediation Phase--OU 2	2030
	Complete Surveillance and Maintenance--OU 2	2055
	Complete Assessment Phase--OU 3	1997
	Complete Remediation Phase--OU 4	2000
	Camplete Surveillance and Maintenance--OU 4	2030
	Complete Assessment Phase--OU 5	1997
	Complete Remediation Phase--OU 5	1999
	Complete Surveillance and Maintenance--OU 5	2055
	Complete Assessment Phase--OU 6	1997
	Complete Remediation Phase--OU 6	2001
	Complete Assessment Phase--OU 7	1995
	Complete Remediation Phase--OU 7	2000
	Camplete Surveillance and Maintenance--OU 7	2030
	Complete Assessment--Plant Areas/Facilities	2008
	Complete Remediation--Plant Areas/Facilities	2055
	Complete Surveillance and Maintenance--Plant Areas/Facilities	2035
	Camplete Assessment Phase--OU 11	1996
	Complete Decammissioning	2060

Major Activity Milestones (cont'd)

ACTIVITY	TASK	COMPLETION DATE
Nuclear Material and Facility Stabilization		Fiscal Year
	Complete Stabilization--Plutonium Buildings/Facilities	2010
	Complete Surveillance and Maintenance--Plutonium Buildings/Facilities	2012
	Complete Stabilization--Non-plutonium Buildings/Facilities	2010
	Complete Surveillance and Maintenance--Non-plutonium Buildings/Facilities	2012
	Complete Stabilization--Facilities/General Support Buildings	2010
	Complete Surveillance and Maintenance--Facilities/General Support Buildings	2012
	Complete Stabilization--Miscellaneous Buildings	2024
	Complete Surveillance and Maintenance--Miscellaneous Buildings	2026
Waste Management		Fiscal Year
	Complete Waste Processing CTMP--TRU-Mixed Treatment to meet WIPP Criteria	2018
	Complete Waste Processing CTMP--LLM Solvent-Contaminated Waste Treatment-Thermal	2017
	Complete Waste Processing CTMP--LLM Solvent-Contaminated-Non-Thermal	2024
	Complete Waste Processing CTMP--LLM Buildings 374/774 Sludge Immobilization	2017
	Complete Waste Processing CTMP--LLM Building 374 Salt Immobilization	2017
	Complete Waste Processing CTMP--LLM Miscellaneous Waste Farms Immobilization	2016
	Complete Waste Processing CTMP--LLM Surface Organic Contaminant Removal/Lead Decontamination	2017
	Path A Reclassification Complete	1998
	Begin Shipping LLM Waste to Nevada Test Site	1998
	Complete CTMP Mixed Waste Treatment of Plutonium LLWM inventory (non-ER)	2022
	Complete Construction of Building 374 Upgrades	1999
	Complete Treatment of Solid Residues	2011
	Complete Closure Mixed Residue Tanks	2017
	Complete Hazardous Excess Material Disposition	1997

For further information on this site, please contact:

	Public Participation Office	*(303) 966-4888*
	Public Affairs Office	*(303) 966-5993*
	Technical Liaison: Gary Reid	*(303) 966-5156*

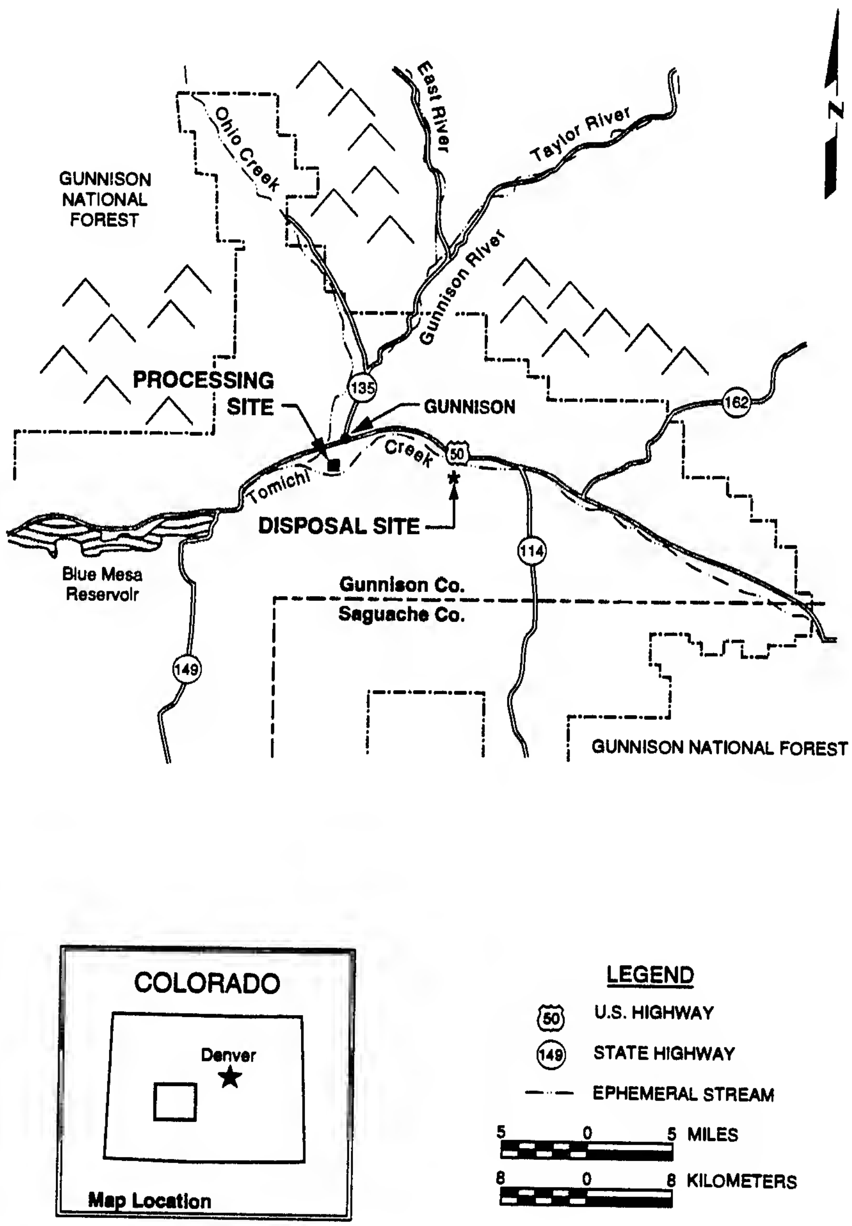
COLORADO UMTRA SITES

The Gunnison mill site, the Maybell mill site, the former Naturita site, and the inactive uranium processing sites at Rifle are five of 24 uranium mill processing sites designated by the Uranium Mill Tailings Radiation Control Act for DOE remediation. Most uranium ore mined in the United States in the 1960's was processed by private firms for the Atomic Energy Commission, a predecessor of the U.S. Department of Energy (DOE). The Act was passed in 1978 in response to public concerns regarding potential health hazards from long-term exposure to uranium mill tailings. It authorized the DOE to stabilize, dispose of, and control uranium mill tailings and other contaminated material at 24 uranium mill processing sites and vicinity properties. Uranium Mill Tailings Remedial Action (UMTRA) activities are funded through the Albuquerque Operations Office.

The model used to estimate costs for this report provides costs for each of the UMTRA sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no UMTRA sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of UMTRA and associated costs, see the UMTRA Site Summary found in the New Mexico section.

GUNNISON
(Uranium Mill Tailings Remedial Action Project)

The Gunnison mill site is located southwest of the City of Gunnison and adjacent to the Gunnison airport. The site covers 61 acres.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	4,250	2,030	1,210	560	1,730	740

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 raflact EM budgat submission, costs for FY 1997-2000 raflact Budgat Shortfall Scanario, costs for shaded araa assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
1,863	691	690	0	0	0	0	18,078

** *Costs reflect a five-year average in constant 1995 dollars, axcapt in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycla is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The mill was owned and operated by the Gunnison Mining Co. from 1958 to 1961 when Gunnison Mining merged with Kermac Nuclear Fuels Corporation, a subsidiary of Kerr-McGee Oil Industries, in late 1961. Kermac operated the mill until it closed in 1962. The site is now owned by the State of Colorado.

DOE will maintain control of the site and continue long-term surveillance and maintenance.

ENVIRONMENTAL RESTORATION

Thirty-nine acres of the site were covered by tailings. Approximately 345,485 cubic yards of uranium mill tailings exist onsite. The activities at Gunnison have resulted in contaminated soil and windblown material.

Remedial action construction is ongoing at Gunnison. To date, DOE has completed the hauling of contaminated materials to a disposal site. In 1995, DOE plans to complete the placement of a disposal cell cover, as well as the construction of long-term site surveillance and maintenance features, e.g., site fencing, survey monuments. DOE also plans to complete restoration of the processing site. Remediation is expected to be completed in Fiscal Year 1998. The following table shows the costs for environmental restoration projects at this site. All funding is from nondefense sources.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
UMTRA-Ground Water - Colorado Remedial Actions	782	691	690	0	0	0	0	11,593
UMTRA-Soils - Colorado Remedial Actions	1,081	0	0	0	0	0	0	6,485
Total	1,863	691	690	0	0	0	0	18,078

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	1,863	691	690	0	0	0	0	18,078

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

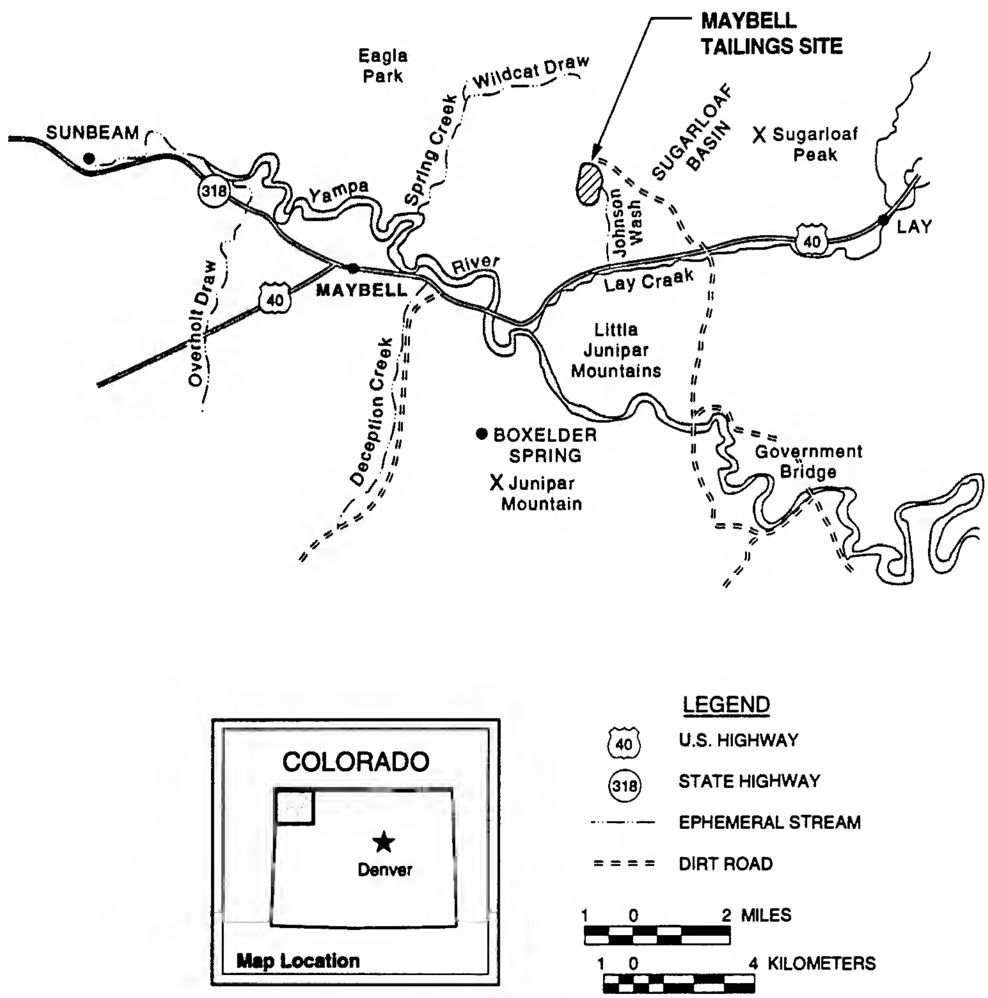
*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

For further information on this site, please contact:

	Public Participation Office	*(505) 845-5951*
	Public Affairs Office	*(505) 845-6202*
	Technical Liaison: Jody Metcalf	*(505) 845-6146*

MAYBELL
(Uranium Mill Tailings Remedial Action Project)

The Maybell mill site and tailings pile are located approximately 25 miles west of the Town of Craig, Colorado. The site covers 110 acres, and there are an additional 182 acres of land containing contamination.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	11,970	9,760	4,270	250	50	0

* *Costs for FY 1995 raflect Congrassional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assuma 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	4,653	0	0	0	0	0	0	27,921

** *Costs raflact a fiva-year avarage in constant 1995 dollars, axcapt in FY 1995 - 2000, which is a six-yaar avaraga.*

*** *Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

There are several open-pit mines surrounding the site. The additional contamination on vicinity properties was deposited by wind or water erosion from the site. Union Carbide Corporation operated the site from 1957 to 1964.

DOE will maintain control of the site and continue long-term surveillance and maintenance.

ENVIRONMENTAL RESTORATION

Approximately 2.8 million cubic yards of uranium mill tailings exist onsite. The activities at this site have also resulted in windblown and waterborne contamination and buried mill debris. Planning is currently ongoing for remediation of the Maybell site. Remedial action will consist of site preparation, tailings excavation, and production of erosion protection materials. Remediation will be initiated and completed at all six vicinity properties associated with the site. Site remediation is expected to be completed in Fiscal Year 1999. The following table shows the costs for environmental restoration projects at this site. All funding is from nondefense sources.

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
UMTRA-Ground Water - Colorado	64	0	0	0	0	0	0	384
UMTRA-Soils - Colorado	4,590	0	0	0	0	0	0	27,537
Total	4,653	0	0	0	0	0	0	27,921

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	4,653	0	0	0	0	0	0	27,921

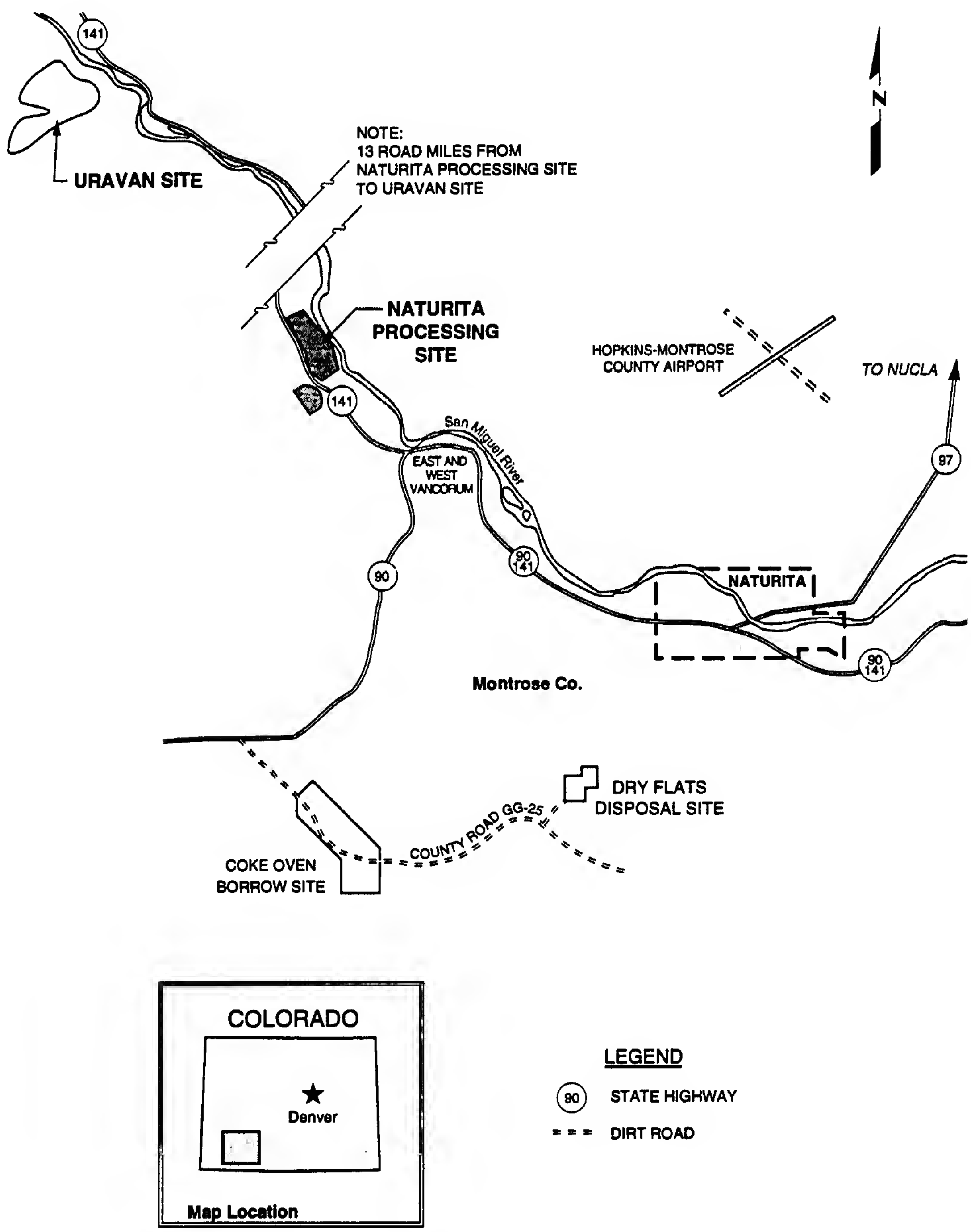
* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

For further information on this site, please contact:	*Public Participation Office*	*(505) 845-5951*
	Public Affairs Office	*(505) 845-6202*
	Technical Liaison: Jody Metcalf	*(505) 845-6146*

NATURITA
(Uranium Mill Tailings Remedial Action Project)

This former mill site is located 2 miles northwest of the Town of Naturita in Montrose County, Colorado. The site is a 53-acre site.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	14,340	7,410	2,370	460	290	910

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenerio, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	4,561	552	429	0	0	0	0	32,271

** *Costs reflect a five-year everege in constant 1995 dollers, except in FY 1995 - 2000, which is a six-yeer average.*

*** *Total Life Cycle is the sum of ennual costs in constent 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The mill was operational from 1939 until the end of World War II by the Vanadium Corporation of America for vanadium recovery. It reopened in 1947 under contract to the Atomic Energy Commission, and uranium concentrates were shipped to the Atomic Energy Commission until the mill was shut down in 1958. The mill was dismantled in 1963 and in 1967, Vanadium Corporation of America was merged into Foote Mineral Co., and ownership of the site passed to Foote. The portion of the site formerly occupied by tailings was purchased by Ranchers Exploration and Development Corporation in 1976.

The Department of Energy will maintain control of the site and continue long-term surveillance and maintenance.

ENVIRONMENTAL RESTORATION

Approximately 704,000 tons of uranium mill tailings existed onsite, and were removed by Ranchers Exploration from 1977-1979. The activities at this site have resulted in waterborne and windblown contamination, contaminated soil, and associated debris and rubble.

Planning is currently ongoing at Naturita. To date, DOE has completed the final site characterization, the identification of cultural resources, finalized the Environmental Assessment and Remedial Action Plan, started processing site demolition, and initiated vicinity property remedial action. In 1995, DOE plans to receive approval of the Final Environmental Assessment and the Final Remediation Action Plan, select the disposal site processing site demolition. Soil remediation is expected to be completed in FY 1998 with ground-water remediation completed

in FY 2010. The following table shows the costs for Environmental Restoration projects at this site. All funding is from nondefense sources.

Environmental Restoration Projects

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
UMTRA-Ground Water - Colorado	392	552	429	0	0	0	0	7,255
UMTRA-Soils - Colorado	4,169	0	0	0	0	0	0	25,016
Total	4,561	552	429	0	0	0	0	32,271

* Costs reflect a five-year everege in constant 1995 dollars, except in FY 2000, which is a six-year everege.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	4,561	552	429	0	0	0	0	32,271

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

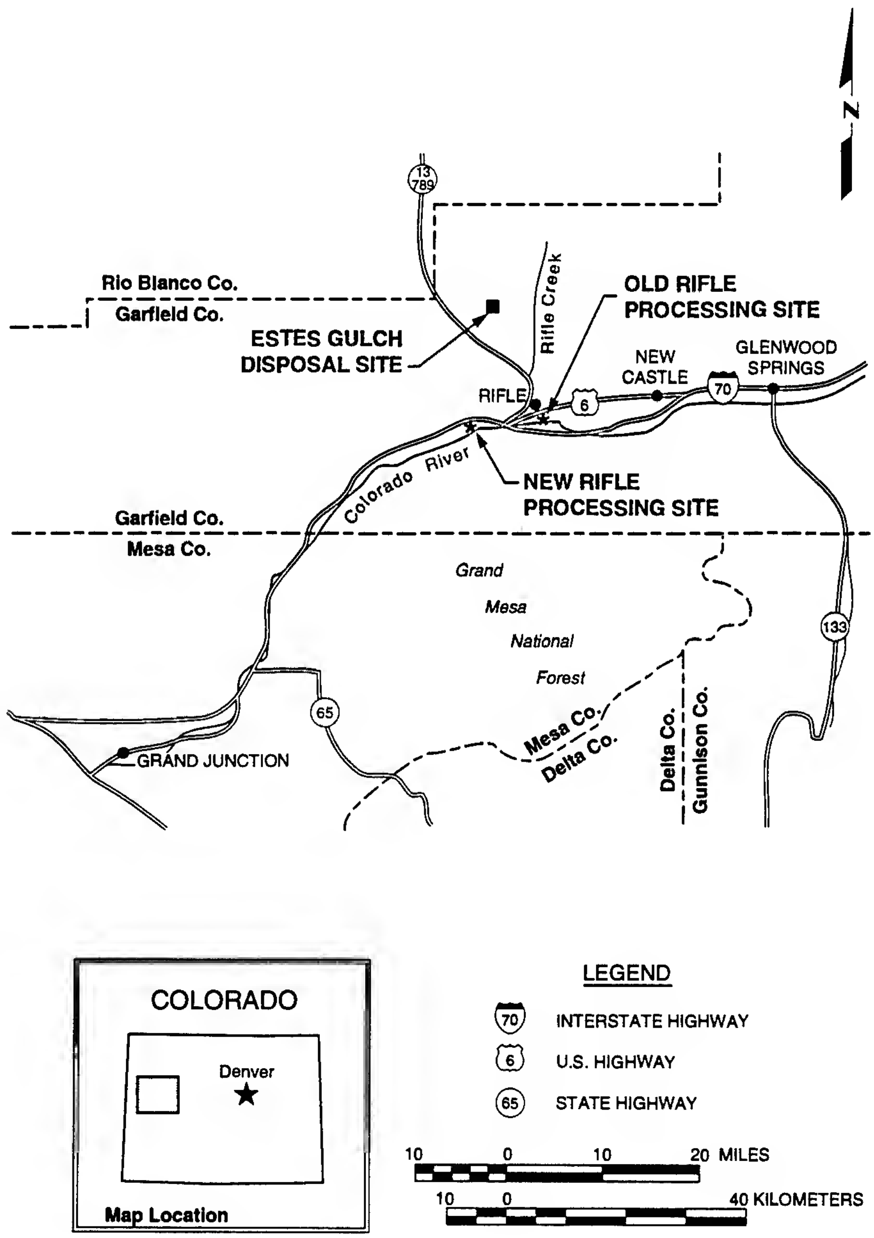
** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

For further information on this site, please contact:

Public Participation Office	*(505) 845-5951*
Public Affairs Office	*(505) 845-6202*
Technical Liaison: Jody Metcalf	*(505) 845-6146*

RIFLE
(Uranium Mill Tailings Remedial Action Project)

The inactive uranium-processing sites at Rifle lie in the Colorado River valley near the City of Rifle. The sites are about 2 miles apart and are referred to as the Old Rifle and New Rifle sites. Old Rifle is a 22-acre site; New Rifle covers approximately 33 acres.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmentol Restorotion	21,521	5,801	708	2,051	2,081	939

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmentol Restorotion	5,858	691	783	0	0	0	0	42,515

** *Costs reflect e five-year average in constent 1995 dollars, except in FY 1995 - 2000, which is a six-yeer everege.*

*** *Totel Life Cycle is the sum of ennuel costs in constent 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The Old Rifle site operated from 1924 to 1932 for the recovery of vanadium from roscoelite ore. The process was altered to include recovery of uranium from 1947 to 1958. The New Rifle mill operated from 1958 to 1973 as part of the complex of upgraders, including those located at Slick Rock, Colorado, and Green River, Utah.

The disposal cell will remain under control of the Department of Energy, and long-term surveillance and maintenance will continue.

ENVIRONMENTAL RESTORATION

Approximately 259,000 cubic yards of uranium mill tailings exist at Old Rifle, and 2 million cubic yards exist at New Rifle. Activities at this site have resulted in the construction of mill buildings, other associated contaminated debris, and contaminated windblown materials.

The hauling of tailings to a disposal cell is currently ongoing at Rifle. To date, DOE has also completed subpile excavation. In 1995, DOE plans to complete the tailings haul, cover placement, and remediation at the site. Soil remediation is expected to be completed in Fiscal Year 1998 with ground-water remediation completed in 2010. The following table shows the costs for environmental restoration projects at this site. All funding is from nondefense sources.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Old Rifle. Remediation Action Plan, select the disposal site, and complete processing site demolition. Soil remediation is expected to be completed in Fiscal Year 1998 with groundwater remediation completed in Fiscal Year 2010. The following table shows the costs for environmental restoration projects at this site. All funding is from nondefense sources.

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
UMTRA-Ground Water - Colorado	952	691	783	0	0	0	0	13,078
UMTRA-Soils - Colorado	4,906	0	0	0	0	0	0	29,437
Total	5,858	691	783	0	0	0	0	42,515

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	5,858	691	783	0	0	0	0	42,515

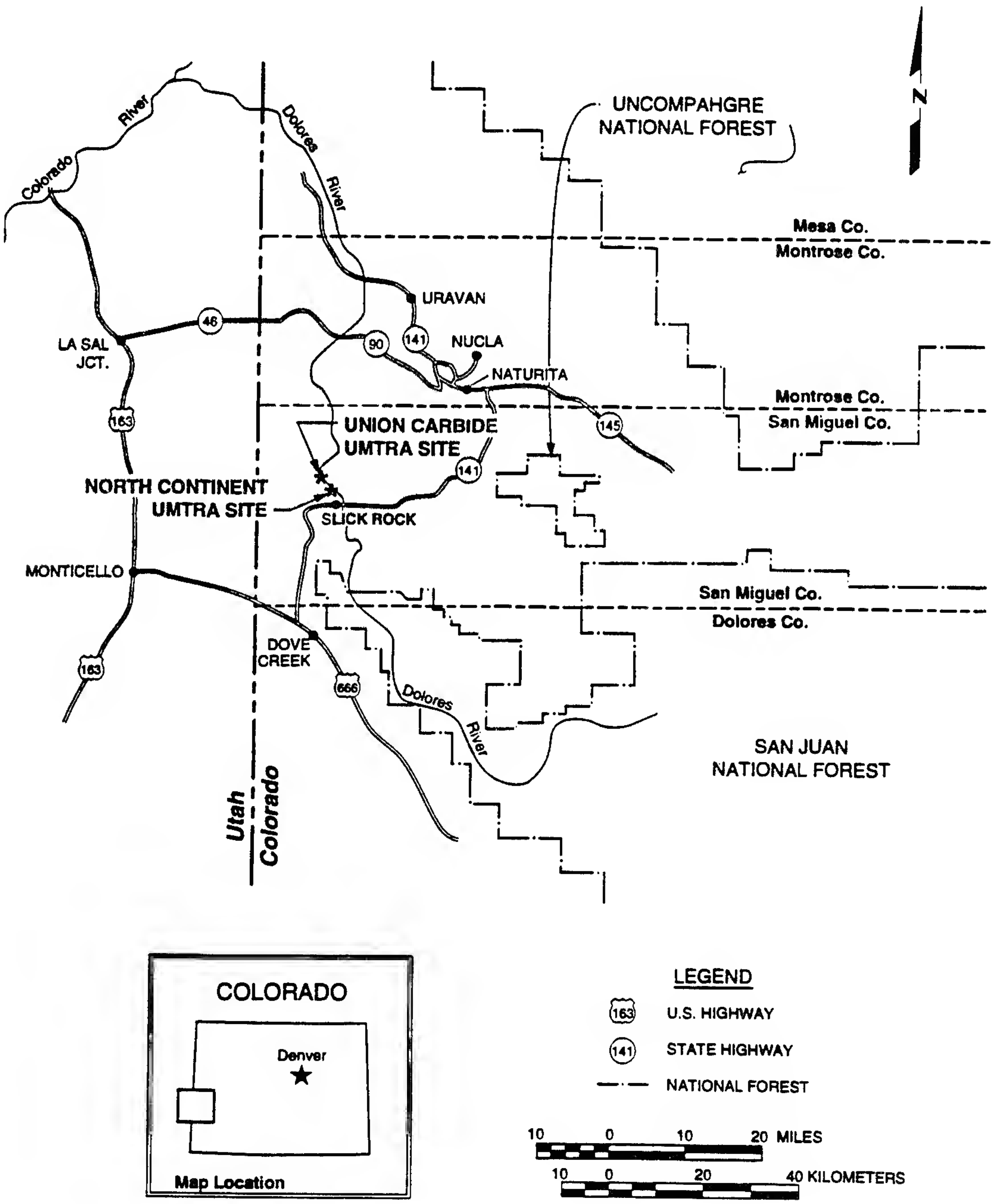
* *Costs reflect a five-yeer everage in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year averege.*

** *Total Life Cycle is the sum of annuel costs in constent 1995 dollars.*

For further information on this site, please contact: *Public Participation Office* *(505) 845-5951*
Public Affairs Office *(505) 845-6202*
Technical Liaison: Jody Metcalf *(505) 845-6146*

UNION CARBIDE CORPORATION AND OLD NORTH CONTINENT (Uranium Mill Tailings Remedial Action Project)

The Union Carbide Corporation and the Old North Continent sites are 1 mile apart and located northwest of the post office at Slick Rock in the Dolores River Valley. The Union Carbide Corporation site covers 93 acres, and the Old North Continent site covers 17 acres.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	10,790	9,910	630	420	670	1,240

* *Costs for FY 1995 reflect Congressionel Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded eree assume 3% ennual infletion.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	4,187	737	614	195	0	0	0	32,852

** *Costs reflect a fiva-yaar averega in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year average.*

*** *Total Lifa Cycle is tha sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

Union Mines Development Corporation, a U.S. Government-established corporation, acquired the site in 1945 for the specific purpose of supplying uranium and vanadium for the Manhattan Project of World War II. The U.S. Government took title to the site in 1949. The Union Carbide Corporation site was acquired by Union Carbide in 1956, and the Old North Continent site was acquired a year later.

The processing site will be restored in 1996 when remedial action will be 100-percent complete.

ENVIRONMENTAL RESTORATION

The cleanup options include moving tailings to the Burrow Canyon disposal site. The Department of Energy (DOE) has identified four vicinity properties in the Slick Rock area. Cleanup of these properties will consist of removing the contaminated materials and disposing of them at the preferred disposal site. The Environmental Restoration Projects table below shows the costs. All funding is from nondefense sources.

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
UMTRA-Ground Water - Colorado	531	737	614	195	0	0	0	10,918
UMTRA-Soils - Colorado	3,656	0	0	0	0	0	0	21,934
Total	4,187	737	614	195	0	0	0	32,852

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle
Environmental Restoration	4,187	737	614	195	0	0	0	32,852

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

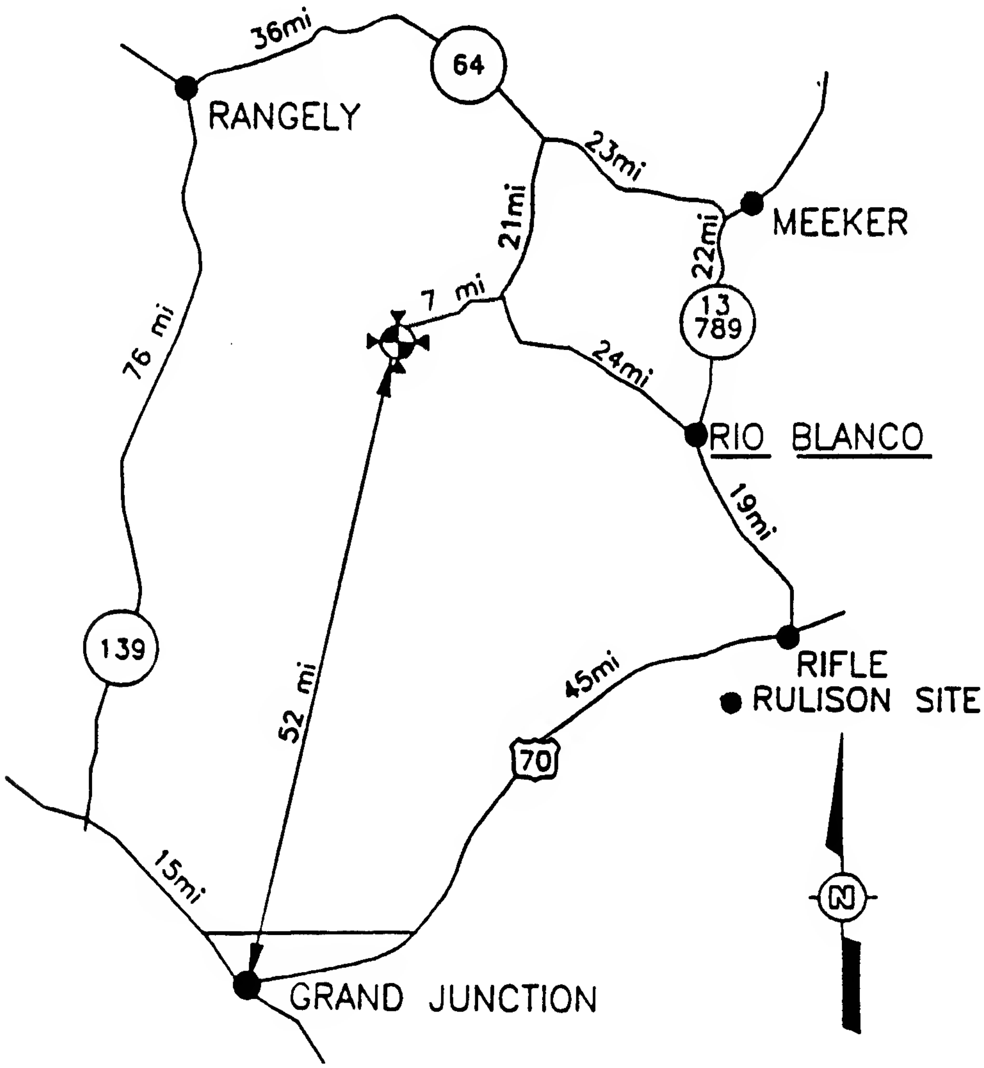
** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

For further information on this site, please contact:	*Public Participation Office*	*(505) 845-5951*
	Public Affairs Office	*(505) 845-6202*
	Technical Liaison: Jody Metcalf	*(505) 845-6146*

RULISON AND RIO BLANCO SITES
(Nevada Offsite Program)

The Rulison and Rio Blanco Sites are administered at the Nevada Operations Office. A more thorough description of the environmental activities managed by the Nevada Operations Office can be found in the Nevada Site Summary. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no Offsites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent defense.

The Rulison Site is located 14 miles (22 kilometers) southwest of Rifle, Colorado. The Rio Blanco Site is located 36 miles (58 kilometers) northwest of Rifle, Colorado.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	70	70	70	1,070	2,070	1,170

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Environmental Restoration	696	105	25	21	12	8	6	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle*****
Environmental Restoration	1	0	0	0	0	0	0	5,073

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Both the Rulison and Rio Blanco tests were conducted under the Plowshare Program, which was a series of nuclear and conventional tests by the Atomic Energy Commission to explore peacetime uses of nuclear explosives. The tests were designed to increase gas production from a low-permeability sandstone. The Project Rulison detonation took place in September 1969 at a depth of 8,426 feet (2,568 m.) in a sandstone formation. The shot was the second of the nuclear gas production stimulation experiments in the Plowshare Program. The Project Rio Blanco test, which consisted of the near simultaneous detonation of three 33 kiloton devices in a 7,000-foot (2,130 m.) well in May 1973, was the third gas production stimulation experiment in the Plowshare Program. The surrounding areas of the two sites are being monitored as part of the Long-Term Hydrological Monitoring Program.

ENVIRONMENTAL RESTORATION

Funding for this activity provides for evaluation and remediation of the Rio Blanco and Rulison gas stimulation testing sites in Colorado. This activity will define the magnitude and extent of contamination and the associated risks to human health and the environment through the evaluation of information on the two test areas. This process includes characterizing the physical setting, determining the presence of contamination, and identifying pathways to potential receptors. Risks to receptors will also be calculated using standard risk assessment procedures. Should risks exceed acceptable limits, the requirements for risk reduction through remediation or other actions will be established. For this estimate, remediation was assumed to include removal of the pond sediment from the drilling mud pit at Rulison and the removal of contaminated surface soils associated with drilling mud at Rio Blanco. Rio Blanco remediation activities were assumed to be complete in 2000. Rulison activities were assumed to begin in 1997 and be complete in 1999. In addition to assessment activities, any requirements for site cleanup or long-term monitoring at the Colorado locations will be established as part of this activity.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Nevada Offsite - Colorado							
Assessment	66	65	0	0	0	0	0
Remedial Actions	630	0	0	0	0	0	0
Surveillance And Maintenance	0	40	25	21	12	8	6
Total	696	105	25	21	12	8	6

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Nevada Offsite - Colorado								
Assessment	0	0	0	[illegible]	0	0	0	722
Remedial Actions	0	0	0	0	0	0	0	3,781
Surveillance And Maintenance	1	0	0	0	0	0	0	570
Total	1	0	0	0	0	0	0	5,073

* *Costs reflect e five-year everage in constent 1995 dollars, except in FY 1995 - 2000, which is e six-yeer everage.*

** *Total Life Cycle is the sum of ennual costs in constent 1995 dollers.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	696	105	25	21	12	8	6

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	1	0	0	0	0	0	0	5,073

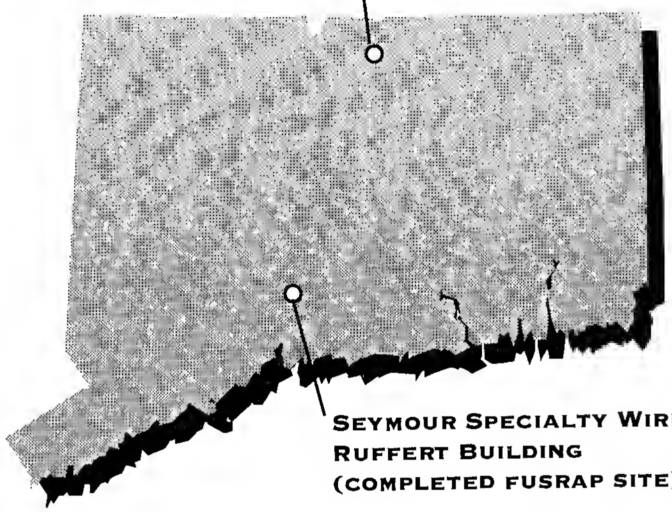
* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Complete Assessment	2004
	Complete Remediation	2000
	Complete Surveillance and Maintenance	2031

For further information on this site, please contact: *Public Participation Office* *(702) 295-4652*
Public Affairs Office *(702) 275-3521*
Technical Liaison: Bobby McClure *(702) 295-1862*



*** A summary is not provided for a facility with completed remedial action.**

CONNECTICUT

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Connecticut - FUSRAP	100	190	820	2,040	1,040	0

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Connecticut - FUSRAP	695	0	0	0	0	0	0	4,171

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

CONNECTICUT FUSRAP SITES

Combustion Engineering is the only active Connecticut site within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and Atomic Energy Commission sites to evaluate their radiological condition and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States and is funded through the Oak Ridge Operations Office. The model used to estimate costs for this report provides one cost for all of the FUSRAP sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs, see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration - FUSRAP	100	190	820	2,040	1,040	0

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assuma 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration - FUSRAP	695	0	0	0	0	0	0	4,171

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of ennual costs in constant 1995 dollars.*

Nondefense Funding Estimate

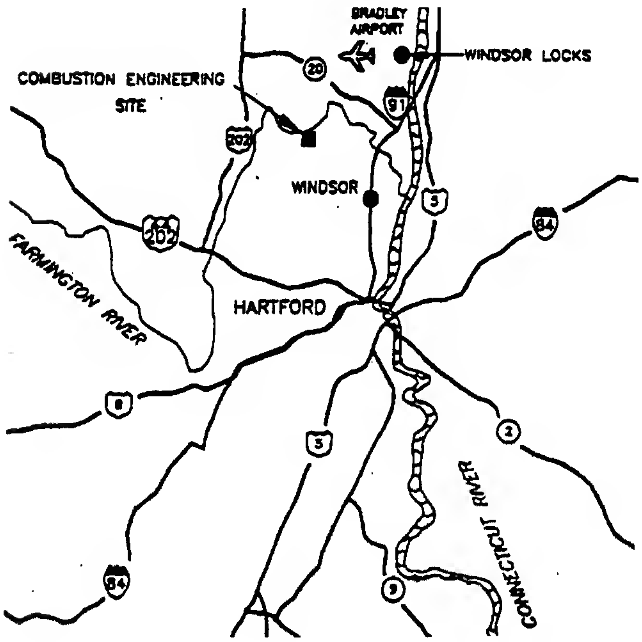
Five-Year Average (Thousands of Constant 1995 Dollars)*

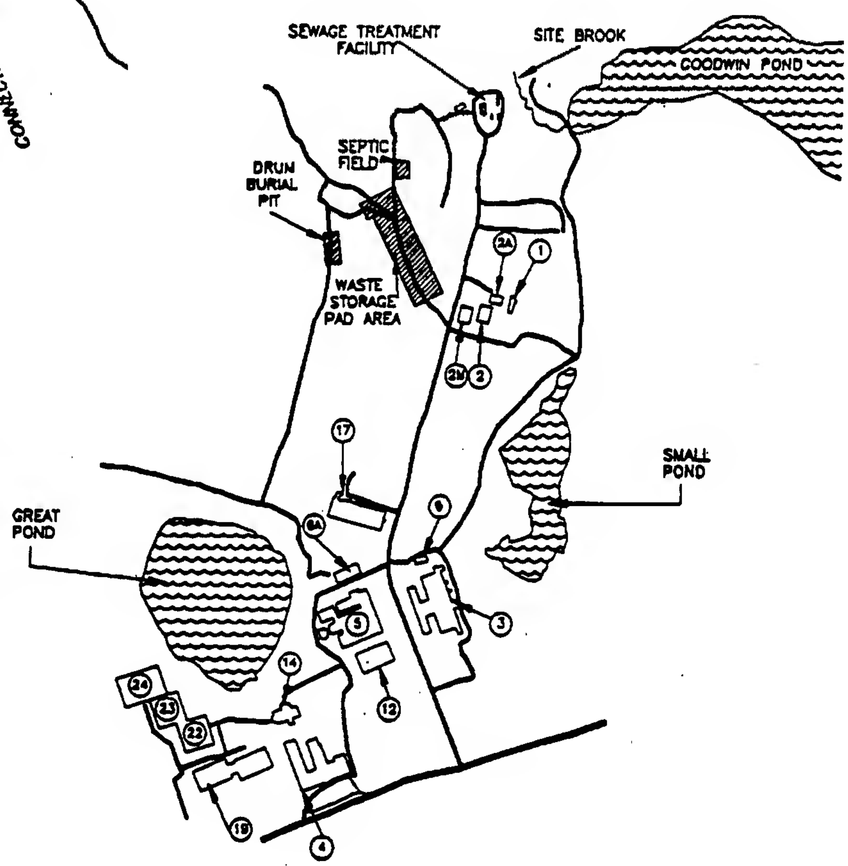
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration - FUSRAP	695	0	0	0	0	0	0	4,171

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

COMBUSTION ENGINEERING
(Formerly Utilized Sites Remedial Action Program)





COMBUSTION ENGINEERING
(Formerly Utilized Sites Remedial Action Program)

The Combustion Engineering site is located in Windsor, Connecticut.

PAST, PRESENT, AND FUTURE MISSIONS

During the late 1940's and early 1950's, Combustion Engineering supplied nonnuclear component parts to the Atomic Energy Commission reactor projects. In 1955, Combustion Engineering was contracted by the Atomic Energy Commission to design a submarine nuclear powerplant facility that ultimately led to the manufacture, assembly, testing, and operation of the S1C Prototype Reactor Facility. An amendment to the contract called for development and fuel fabrication work involving high-enriched uranium (i.e., enriched to contain more than 20 percent of the isotope uranium-235). In the early 1960's, Combustion Engineering began commercial reactor fuel fabrication that did not involve the use of high-enriched uranium. The Atomic Energy Commission's work continued until July 1967.

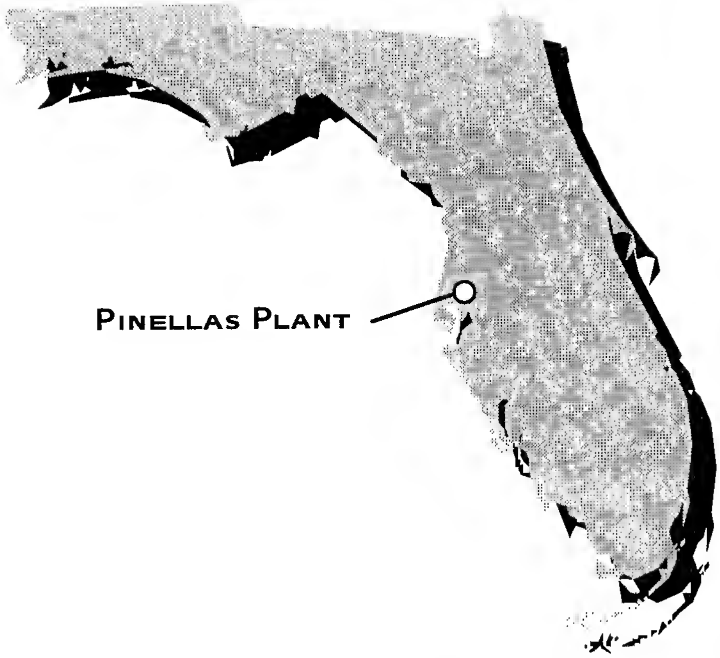
Future use of this site depends on resolution of the cleanup decision documents. Because this is a Nuclear Regulatory Commission licensed facility, these documents will include the land use that the Nuclear Regulatory Commission deems suitable.

ENVIRONMENTAL RESTORATION

A radiological survey found residual high-enriched uranium within buildings, inside some sewer lines, in a drum -burial area, and in portions of the surrounding soil. The designation of this site is restricted to the areas that were affected by Atomic Energy Commission contractual activities. It does not include areas used for commercial activities. This site was added to the FUSRAP program on June 30, 1994. Remediation of some areas was performed by Combustion Engineering in 1986.

For further information on this site please contact:

Public Participation Office (615) 576-1590
Public Affairs Office (615) 576-0885
Technical Liaison: Melyssa Noe (615) 241-3315



FLORIDA

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Pinellas	7,637	43,656	39,700	8,100	2,800	2,000

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

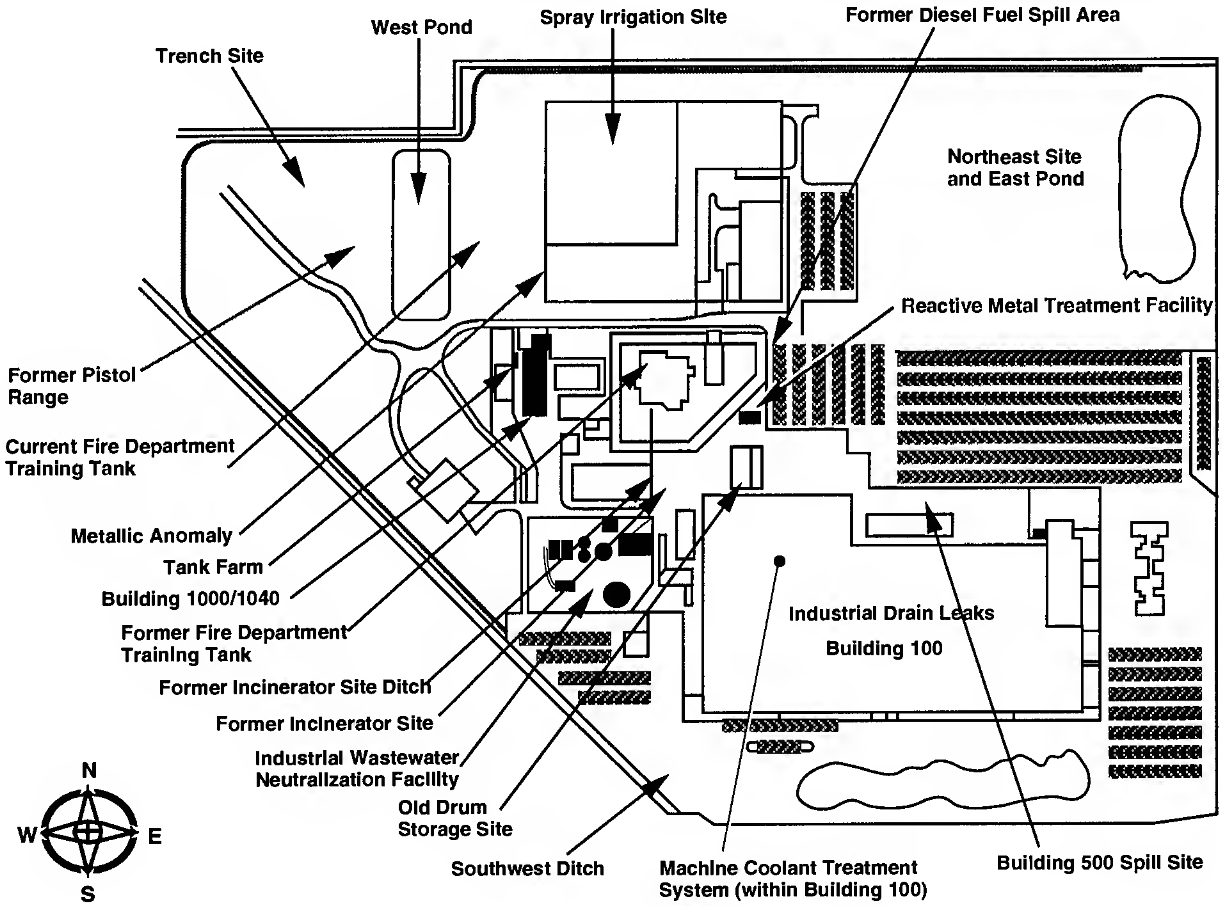
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Pinellas	16,511	26,968	0	0	0	0	0	233,910

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year averege.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PINELLAS PLANT

The Pinellas Plant occupies a 99.2-acre site approximately 6 miles north of St. Petersburg in Pinellas County, Florida. Pinellas County is located on a peninsula bordered on the west by the Gulf of Mexico and on the east and south by Tampa Bay.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	4,800	6,400	3,300	3,300	2,000	1,200
Waste Management	2,537	2,356	2,700	800	800	800
Nuclear Material and Facility Stabilization	0	5,000	7,000	4,000	0	0
Directly Appropriated Landlord	0	29,500	26,500	0	0	0
Program Management	300	400	200	0	0	0
Total	7,637	43,656	39,700	8,100	2,800	2,000

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area essume 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	3,326	20,173	0	0	0	0	0	120,820
Waste Management	1,584	5,436	0	D	0	D	0	36,685
Nuclear Material and Facility Stabilization	2,519	0	D	0	0	D	0	15,113
Directly Appropriated Landlord	8,937	0	0	0	0	0	0	53,620
Program Management	146	1,359	0	0	0	0	0	7,673
Total	16,511	26,968	0	0	0	0	0	233,910

** Costs reflect a five-year everage in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The Pinellas Plant has been part of the Department of Energy's (DOE) nuclear weapons complex since the plant opened in 1957. The plant's first assignment was the development and production of neutron generators, which are used as external initiators in nuclear weapons. The product line was expanded to include lightning-arrester connectors, capacitors, magnetics, optoelectronic devices, and other components.

In September 1994, the plant stopped producing weapons-related components and has transitioned from a defense mission to an environmental management mission. The landlord for the site is now Environmental Management.

The current mission is to achieve a safe shutdown of the facility and prepare the site for alternative uses as a community resource for economic development. The transition includes moving material and equipment to other DOE sites to continue production of certain products and assemblies. Material and equipment not needed at other DOE sites will be processed as excess and then may be scrapped or transferred to the Community Reuse Organization if it can aid economic development initiatives.

The Tampa Bay Defense Transition Task Force, an organization representing the surrounding communities, has prepared a future-use plan that envisions the plant as a manufacturing "mall." The mall would consist of businesses operated by the current management and operating contractor and other businesses recruited by local economic development organizations. The establishment of this commercial manufacturing technology center at the site is supported by the National Institute of Standards and Technology and the State of Florida.

Waste management and environmental restoration activities should be completed by FY 2000; however, it is possible that ground-water remediation will continue through approximately FY 2005. Therefore, cost estimates through FY 2005 have been included for planning purposes.

ENVIRONMENTAL RESTORATION

Ground-water contamination from volatile organic compounds is the main environmental concern at the Pinellas Plant. In February 1990, the U.S. Environmental Protection Agency identified 15 solid waste management units that may have environmental contamination as a result of past plant activities. Environmental investigations later revealed that 12 of these units do not pose a threat to public health or the environment. Contaminant concentrations exceeding drinking water standards have been detected in ground water at the remaining three units: the Northeast Site, the Old Drum Storage Area, and Building 100 Industrial Drain Leaks.

During site characterization and routine soil, water, and ground-water monitoring, two additional areas, the West Fenceline Area and the Wastewater Neutralization/Building 200 Area, were identified as having ground-water contamination exceeding protective standards. Two of the five solid waste management units, the Old Drum Storage Area and Building 100 Industrial Drain Leaks were combined, resulting in four onsite areas that require further action. The fifth site is a privately owned 4.5-acre parcel of land adjacent to the Pinellas Plant where ground-water contamination exists from activities conducted during previous DOE ownership. Localized ground-water contamination is the primary concern at all five sites. The contaminants are limited to the surficial aquifer below the plant site and have not contaminated deeper geologic units.

Priorities for remedial action at the five solid waste management units have been established, taking into account such factors as toxicity, volume or extent of potential contamination, the mobility of contaminants, and offsite migration. These priorities call for completing the following activities in FY 1996: the interim remediation activities currently being conducted at the 4.5-acre and Northeast Sites, Resource Conservation and Recovery Act Facility Assessment and Investigation at the two newly identified solid waste management units, and planned interim corrective measures at the West Fenceline Area. Remediation of ground water, by pumping and treatment of three contaminant plumes, is to be completed by FY 2020. The completion of the Remedial Action Plan for the 4.5-acre site will occur in FY 1996. In addition, the Corrective Measures Study at the solid waste management units identified for further action is scheduled for completion in FY 1997.

The decommissioning of the Pinellas Plant has been addressed by the Decontamination and Decommissioning Summary Site Plan. This plan contains three scenarios for the plant: complete commercialization, partial decommissioning, and complete decommissioning. Current plans call for converting the plant for future

commercialization. However, cost estimates for a worst-case scenario were also developed. This scenario assumes that all conversion activities fail and the plant must be fully decommissioned. The estimate covers all waste disposal costs for this decommissioning scenario.

WASTE MANAGEMENT

The main objective of the waste management activities is to safely treat, store, and dispose of all hazardous and radioactive waste generated during decommissioning and environmental restoration activities while meeting applicable Federal, State and local requirements. These activities include the cleanup of process equipment, storage areas, and production areas. The majority of waste treatment, storage, and disposal activities beyond FY 1995 focus on safe shutdown. These cleanup activities will generate both low-level radioactive and hazardous chemical waste, and they may generate low-level mixed waste as well. After 1997, waste management will be limited to waste generated by environmental restoration.

Low-level radioactive waste from the cleanup of tritium processing areas, including laboratories, will consist of approximately 200 B-25 boxes of waste and 220 55-gallon drums. Hazardous waste generated from the cleanup of process areas will consist of approximately 2,000 55-gallon drums and 30 twenty-yard "roll-off" containers of hazardous debris.

Waste Treatment

The Pinellas Plant treats hazardous and nonhazardous waste such as machine coolant; aqueous solutions from plating baths; and reactive paper, powders, and metals. These activities will be completed during FY 1995 and FY 1996 to meet the accelerated plant shutdown schedule for cleaning up equipment and process areas.

The Pinellas Plant has been assigned the task of developing a mercury amalgamation mobile treatment unit for low-level mixed radioactive

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	128	0	0	0	0	0	0	765
Remedial Actions	2,107	73	0	0	0	0	0	13,005
Facility Decommissioning	1,092	20,100	0	0	0	0	0	107,050
Total	3,326	20,173	0	0	0	0	0	120,820

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

waste. This mobile unit will be developed by FY 1996 and will be used to treat similar low-level mixed waste at other sites operated by the Department.

Waste Storage

The Pinellas site has two buildings for storage of waste. Building 1040 contains three bays: Bay 1 can contain up to 3,520 gallons of solid/liquid waste such as halogenated solvents and ignitable liquids; Bay 2 can contain up to 1,760 gallons of nonliquid reactive waste; Bay 3 can store 660 gallons of hazardous and non-regulated waste. Radioactive waste is stored onsite in Building 100 until shipments can be made to the Savannah River Site. New curie limits per container impact how much material will be accepted by Savannah River. Some material being disposed of exceeds this limit. The Pinellas Plant is working with DOE and Savannah River to ensure removal of all radioactive waste before the end of FY 1997.

The plant's shutdown activities require additional storage containers for hazardous, nonhazardous, and low-level radioactive waste. The cost for these containers has been included in the waste management estimates. Environmental remediation and the dismantlement of war reserve products will also generate a need for more waste containers.

Most of these costs will be incurred during FY 1995, although some costs will carry over into FY 1996 and FY 1997.

Waste Disposal

Waste disposal activities will be accelerated as more frequent shipments are necessary to comply with the Pinellas Plant's Hazardous Waste Operating Permit and regulatory requirements. The plant instituted a "seven-point" reuse program for virgin material. This program identifies several potential opportunities for the reuse of virgin material before disposing of it as waste. Economic

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-Level Waste	471	307	0	0	0	0	0	4,361
Storage and Handling								
Low-Level Waste	102	41	0	0	0	0	0	817
Hazardous Waste	1,010	5,088	0	0	0	0	0	31,500
Total	1,584	5,436	0	0	0	0	0	36,685

* *Costs reflect a five-year averege in constant 1995 dollars, except in FY 1995-2000, which is e six-yeer average.*

** *Total Life Cycle is the sum of ennual costs in constant 1995 dollers.*

development at Pinellas has the potential for using not only virgin, but also in-process, material for new business. If new businesses use these materials, disposal costs will be reduced.

Hazardous waste is disposed of through commercial facilities. Radioactive waste is transferred to the Savannah River Site; however, the Pinellas site is currently working on an application to dispose of some radioactive waste at the Nevada Test Site.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

As mentioned in the above text, DOE will complete the sale of the Pinellas Plant and property to the County of Pinellas Community Reuse Organization. The Community Reuse Organization will lease back to the Department those portions of the facility that are required for the completion of the production mission. Other portions of the facility will be leased to Martin Marietta Specialty Components for their planned commercial production requirements.

DOE's mission will be completed in FY 1997 and facility stabilization activities will begin at that time. These activities include draining process lines and equipment, draining hydraulic fluids from surplus equipment, fixing and stabilizing process contamination, and other general housekeeping activities to make the facility ready for new tenants for the county.

With the exception of one room containing tritium contamination and some Nuclear Regulatory Commission licensed sealed calibration sources, there are no nuclear materials at the Pinellas Plant and contamination is limited to the tritium area. It is anticipated that tritium operations will

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	2,519	0	0	0	0	0	0	15,113

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Landlord Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Directly Appropriated Landlord	8,937	0	0	0	0	0	0	53,620

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

continue under an Nuclear Regulatory Commission license, and decommissioning of the tritium operations will be delayed until the end of its useful life.

LANDLORD FUNCTIONS

Landlord activities encompass several different functional areas and cost items. These include support for the environmental, safety, and health program; site planning and project management; utilities; and management and administration (e.g., human resources, procurement, taxes, and logistics support). Support within these categories is the minimum amount of activity necessary to provide a caretaker function while maintaining compliance with applicable Federal, State, and local laws and regulations.

PROGRAM MANAGEMENT

The Pinellas Plant has no separate funding for program management. Program management costs for environmental restoration activities after FY 2000 are included within the environmental restoration scope. However, some program management activities cross-cut all environmental restoration and waste management projects and are not directly in support of specific base operations or projects. They include regulatory support, contractor training, quality assurance, support for public participation, Safe Shutdown/Transition and Decommissioning Activities and Federal Facility Compliance Act management, waste certification, and waste minimization.

Waste minimization emphasizes the need to minimize handling, storage, and disposal costs. The waste minimization coordinator, along with process-waste assessment teams, will identify ways to reduce waste streams during shutdown. Some alternatives include returning chemicals to vendors, investigating technological developments to reduce cleanup costs, and recycling chemicals to new business or other local businesses.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Pinellas Plant.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	146	1,359	0	0	0	0	0	7,673

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year averege.*

*** Total Life Cycle is the sum of ennual costs in constant 1995 dollars.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restorotion	3,326	20,173	0	0	0	0	0	120,820
Woste Monagement	1,584	5,436	0	0	0	0	0	36,685
Nuclear Moteriol ond Facility Stobilization	2,519	0	0	0	0	0	0	15,113
Oirectly Appropriated Londlord	8,937	0	0	0	0	0	0	53,620
Program Monogement	146	1,359	0	0	0	0	0	7,673
Total	16,511	26,968	0	0	0	0	0	233,910

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

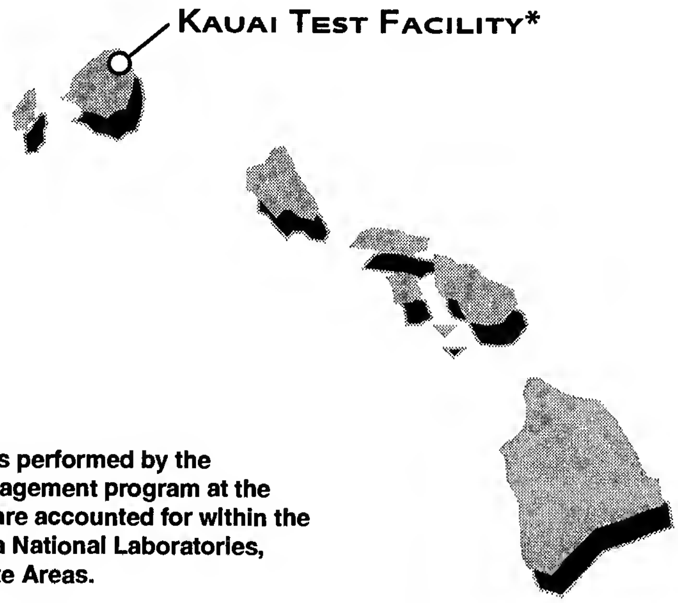
** Total Life Cycle is tha sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmentol Restorotion:		Fiscal Year
4.5 Acre Site	Remediol Actian & Closure Completion	2000
Wastewater Neutrolizotion Areo/Building 200	RFI Plan/Fieldwork/Report	1996
	Carrective Meosures Study Plon/Repart	1996
Nartheast Site	Environmentol Assessment (EA) & Statement af Basis	1995
	Confirmation Study & Finol Corrective Meosures Camplete	2014
Old Drum Starage Areo/Building 100	CM Fieldwork Construction Camplete	1996
	Confirmation Study & Finol CM Complete	2014
Decammissianing	Begin Decammissioning Planning	1996
Decammissianing	Camplete Decommissianing Designs, Safety Analysis, & Readiness Reviews	1998
	Initiate Decammissianing	1998
Waste Management:		Fiscal Year
Site Treatment Plan	Submit the Final Status Report and Contingency Plan to the State of Florida	1995
Affirmative Pracurement	Affirmative Procurement Program Annuol Report	1994 & 1995

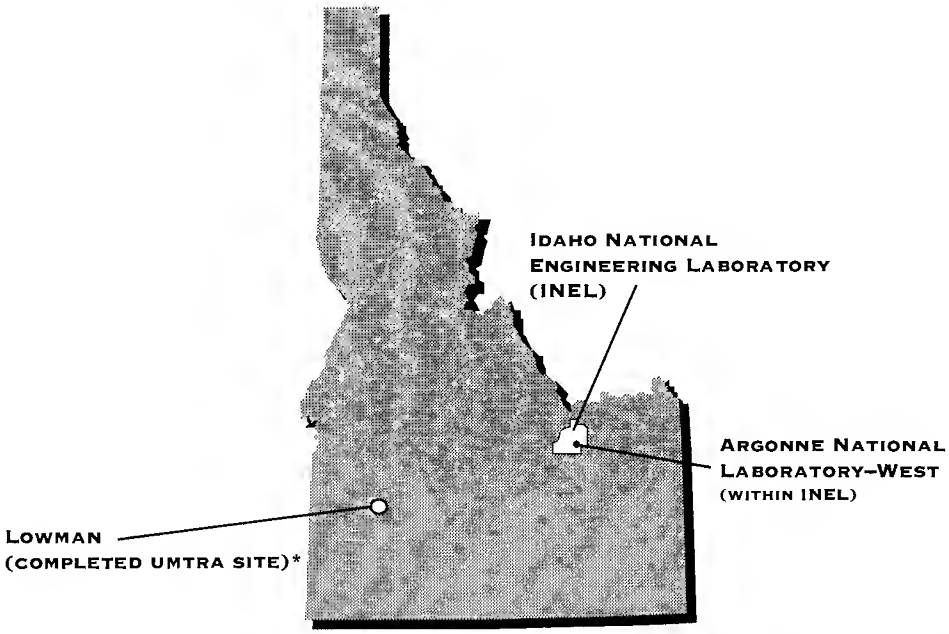
For further information on this site, please contact:

Public Participation Office	*(505) 845-5951*
Public Affairs Office	*(505) 845-6202*
Technical Liaison: Dave Ingle	*(813) 541-8943*



* Costs for activities performed by the Environmental Management program at the Kauai Test Facility are accounted for within the scope of the Sandia National Laboratories, Albuquerque, Offsite Areas.

HAWAII



*Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for this facility is provided in the following table.

IDAHO

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Argonne National Laboratory - West	4,466	5,178	18,487	22,659	38,102	16,617
Idaho National Engineering Laboratory	462,106	492,084	517,370	505,017	501,650	497,549
Completed UMTRA - Surveillance and Monitoring	0	110	0	0	0	0
Total	466,572	497,372	535,857	527,676	539,752	514,166

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Argonne National Laboratory-West	15,973	6,579	6,058	6,070	5,973	5,949	5,718
Idaho National Engineering Laboratory	460,765	561,620	622,025	565,682	573,202	535,736	647,357
Completed UMTRA - Surveillance and Monitoring	20	0	0	0	0	0	0
Total	476,759	568,199	628,082	571,752	579,175	541,686	653,076

	2035	2040	2045	2050	2055	2060	2065
Argonne National Laboratory-West	0	0	0	0	0	0	0
Idaho National Engineering Laboratory	624,746	421,505	326,635	292,887	35,395	7,062	6,946
Completed UMTRA - Surveillance and Monitoring	0	0	0	0	0	0	0
Total	624,746	421,505	326,635	292,887	35,395	7,062	6,946

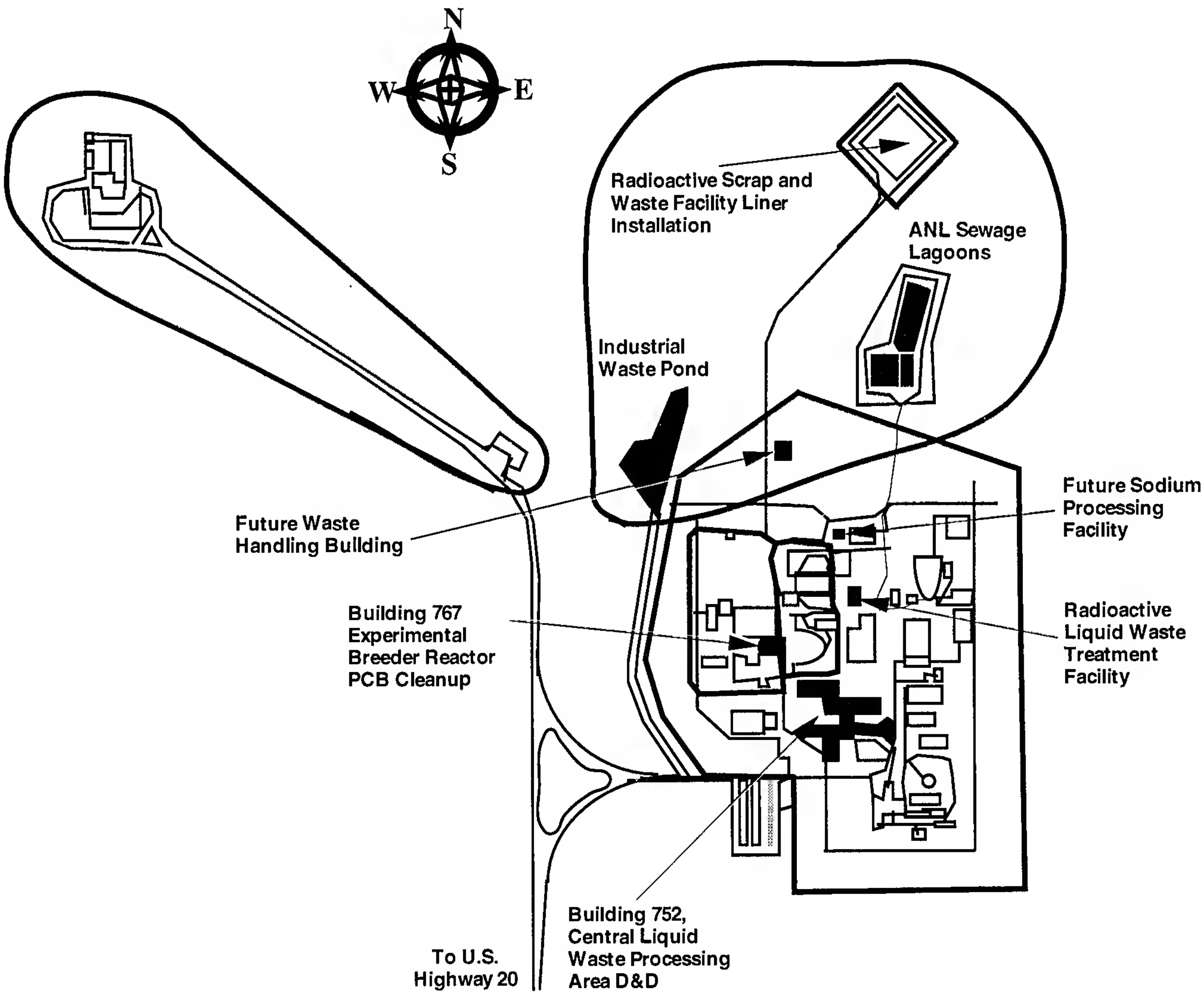
	2070	2075	2080	2085	2090	2095	2100	Life Cycle***
Argonne National Laboratory-West	0	0	0	0	0	0	0	277,570
Idaho National Engineering Laboratory	5,890	4,879	4,960	2,976	1	1	0	28,962,566
Completed UMTRA - Surveillance and Monitoring	0	0	0	0	0	0	0	122
Total	5,980	4,879	4,960	2,976	1	1	0	29,240,258

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

ARGONNE NATIONAL LABORATORY-WEST

Argonne National Laboratory-West is located on the Idaho National Engineering Laboratory site, 42 miles northwest of Idaho Falls, Idaho. Argonne National Laboratory-West is managed by the Department of Energy's (DOE) Chicago Operations Office.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	956	1,903	2,431	2,474	2,505	2,566
Waste Management	3,167	2,808	15,557	19,669	35,064	13,500
Program Management	343	467	499	516	533	551
Total	4,466	5,178	18,487	22,659	38,102	16,617

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	1,966	527	72	85	19	0	0	15,311
Waste Management	13,559	5,817	5,768	5,767	5,759	5,759	5,535	253,377
Program Management	448	235	217	217	195	190	183	8,883
Total	15,973	6,579	6,058	6,070	5,973	5,949	5,718	277,570

** Costs reflect a five-year average in constent 1995 dollars, except in FY 1995-2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The primary mission of Argonne National Laboratory-West has been support of liquid metal reactor research and development for the Integral Fast Reactor Program. With the termination of the Integral Fast Reactor program, the resources at Argonne National Laboratory will be redirected to higher priority missions of DOE. The redirected activities at Argonne National Laboratory-West will include technology development for spent nuclear fuel and waste treatment, reactor and fuel cycle safety, and decommissioning. Surplus facilities at the site including the Experimental Breeder Reactor-II and the Transient Reactor Test Facility will be shut down. The future use of the site will be for research and development; potentially for waste treatment activities.

ENVIRONMENTAL RESTORATION

Argonne National Laboratory-West generates primarily solid radioactive waste, although some gaseous waste (600 curies/year total) is released from the 10 exhaust stacks. The radioactive waste consists of radionuclides, mixed fission products, activation products, tritium, uranium, thorium, and daughter products. Mixed waste, primarily solid waste containing elemental sodium, is also generated in small quantities. Hazardous waste consists primarily of paint removers and analytical chemical waste, along with some heavy metals, polychlorinated biphenyls (PCBs), organics, corrosives, and dioxins/furans. All waste is generated during routine operations at Argonne National Laboratory-West facilities, some of which have been in operation since the late 1950's.

On December 21, 1989, the Idaho National Engineering Laboratory was added to the Environmental Protection Agency's (EPA's) National Priorities List under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). On December 9, 1991, the Idaho National Engineering Laboratory Federal Facility Agreement/Consent Order was signed and approved by DOE, EPA, and the Idaho Department of Health and Welfare. Argonne National Laboratory-West is included in this Federal Facility Agreement and is designated as West Area Group 9.

Waste Area Group 9 Assessment

Waste Area Group 9 sites being investigated include tanks and wastewater handling/ disposal systems such as ditches, ponds, pits, and drains. The boundary of Waste Area Group 9 is basically the Argonne National Laboratory-West administrative boundary, although operations that extended or extend outside the fence are included.

There are 36 Solid Waste Management Units and 1 Land Disposal Unit being investigated under the Federal Facility Agreement/Consent Order. Eighteen Solid Waste Management Units have been designated as no-action units in the Federal Facility Agreement/Consent Order.

Waste Area Group 9 assessment activities will be performed under an accelerated Remedial Investigation/Feasibility Study schedule, resulting in approximately one year of schedule compression. Planned activities included one Track 1 study, which is essentially complete; two Track 2 studies; and one Remedial Investigation/Feasibility Study. The Track 1 study involves the analysis of existing data, evaluation of risk potential, and development of a summary report. These studies have been used to evaluate whether or not the 10 associated Solid Waste Management Units will proceed through a Track 2, an interim action, or a Remedial Investigation/Feasibility Study. At this time, two of the Track 1 sites are expected to have follow-on actions performed in FY 1995.

The Track 2 studies will include field work to enable regulators and DOE to reach conclusions on the action required for the associated Solid Waste Management Units. Based on recent discussions, only two of the Track 2 Solid Waste Management Units have been identified as sites that require sampling and updated risk assessments before being recommended for "no further action." A Remedial Investigation/Feasibility Study will also be completed for 4 Solid Waste Management Units and 1 Land Disposal Unit. Following completion of Track 1 and Track 2 studies and some additional pre-Remedial Investigation/Feasibility Study sampling, the Remedial Investigation/Feasibility Study will be performed, the final record of decision will be drafted, and post-record of decision activities will begin. Remedial action will be completed by 2005 with ground-water monitoring continuing through 2016.

Central Liquid Waste Processing Area Decommissioning

Surveillance and maintenance will continue until funding is available to complete National Environmental Policy Act documentation. Title I, Title II, and Title III engineering for the decommissioning will begin and will include plans for removal of radioactively contaminated process equipment. The actual decommissioning is expected to be complete in FY 1999.

Cost of Environmental Restoration

The estimated costs of environmental restoration at Argonne National Laboratory-West are given in the table below.

WASTE MANAGEMENT

Waste will continue to be shipped to Idaho National Engineering Laboratory for treatment, storage, and disposal. The bulk sodium waste located at Argonne National Laboratory-West will be treated between FY 1997 and FY 1999. At assumed funding levels, a centralized waste handling facility will be constructed and ready for use in FY 1999.

Environmental restoration activities are scheduled to end in FY 2020. However, laboratory operations will continue to generate waste. Continuing waste management activities in support of ongoing programs are projected at a cost of approximately $5.7 million per year. To facilitate the development of this Life Cycle cost estimate, an arbitrary cutoff date of 2030 has been assigned to all sites that have completed environmental restoration but maintain ongoing waste management support of other Department programs (Nuclear Energy, Energy Research, etc.).

Waste management activities include continuing hazardous waste management from collection through disposal; radioactive (low-level, transuranic, low-level mixed, and transuranic mixed) waste management; implementation of Resource Conservation and Recovery Act (RCRA) Part B Permit requirements for the Radioactive Scrap and Waste Facility; development of the RCRA Part B Permit for Building 703 sodium storage; training; industrial waste system operations and disposal; waste minimization activities; development of a Wastewater Land Application permit; and operation of the Radioactive Liquid Waste Transfer Facility.

Waste Treatment

The scope of activities in this category includes all activities necessary to provide a treatment facility, the Remote Treatment Facility, for radioactive sodium waste in compliance with provisions of the RCRA Land Disposal restrictions and the Federal Facility Compliance Act. The Remote Treatment Facility will provide the capability to remove and process sodium from radioactive material of the categories of waste produced or stored at Argonne National Laboratory-West. The options analysis for this facility will be complete in FY 1996.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	1,422	0	0	0	0	0	0	8,531
Remedial Actions	230	406	0	0	0	0	0	3,406
Surveillance And Maintenance	0	121	72	85	19	0	0	1,484
Facility Decommissioning	315	0	0	0	0	0	0	1,890
Total	1,966	527	72	85	19	0	0	15,311

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Waste Management Projects

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Remote Mixed Waste Treatment Facility	8,427	0	0	0	0	0	0	50,600
Waste Handling Facility	474	0	0	0	0	0	0	2,800

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

Waste Management Activity Costs

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle
Treatment								
Transuranic Waste	220	57	57	57	57	57	47	2,989
Low-Level Waste	5,557	3,970	3,970	3,970	3,970	3,970	3,970	152,458
Storage and Handling								
Low-Level Mixed Waste	47	10	10	9	0	0	0	413
Low-Level Waste	2,450	446	398	398	398	398	451	27,144
Hazardous Waste	3,540	878	878	878	878	878	702	46,702
Sanitary Waste	1,745	455	455	455	455	455	364	23,661
Total	13,559	5,817	5,768	5,767	5,759	5,759	5,535	253,377

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Waste Storage

This category includes costs and equipment associated with the upgrade of the Radioactive Scrap and Waste Facility. Included is replacement of liners and cathodic protection for continuing compliance with Idaho National Engineering Laboratory's RCRA Part B Permit.

A Waste Handling Facility for low-level, hazardous, mixed, and sanitary waste generated at Argonne National Laboratory-West is to be designed and constructed to replace a temporary structure currently in use. The Waste Handling Facility will provide a single location for processing and shipping waste generated at Argonne National Laboratory-West facilities. An Environmental Assessment and a conceptual design for the Waste Handling Facility have been completed.

Waste Disposal

All waste generated at Argonne National Laboratory-West is shipped to the Idaho National Engineering Laboratory for disposal.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

Argonne National Laboratory-West currently is not planned to undergo nuclear material and facility stabilization.

LANDLORD FUNCTIONS

At present, landlord activities at Argonne National Laboratory-West are primarily the responsibility of DOE's Nuclear Energy program. The Environmental Management program at Argonne National Laboratory-West supports landlord activities through a percentage of overhead that is calculated on an annual basis.

PROGRAM MANAGEMENT

Water and soil samples will be analyzed. This baseline information will then be used to conduct risk assessment for the Remedial Investigation/Feasibility Study process. Safety analyses will be conducted for all restoration projects as the need is established. Regulatory corrective action for projects and/or activities under regulations such as Toxic Substances Control Act, RCRA, CERCLA, and Federal Insecticide, Fungicide, and Rodenticide Act will be evaluated. An Agreement-in-Principle signed with the State of Idaho on May 21, 1990, is also funded.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Argonne National Laboratory-West.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	448	235	217	217	195	190	183	8,883

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	1,966	527	72	85	19	0	0	15,311
Waste Management	13,559	5,817	5,768	5,767	5,759	5,759	5,535	253,377
Program Management	448	235	217	217	195	190	183	8,883
Total	15,973	6,579	6,058	6,070	5,973	5,949	5,718	277,570

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

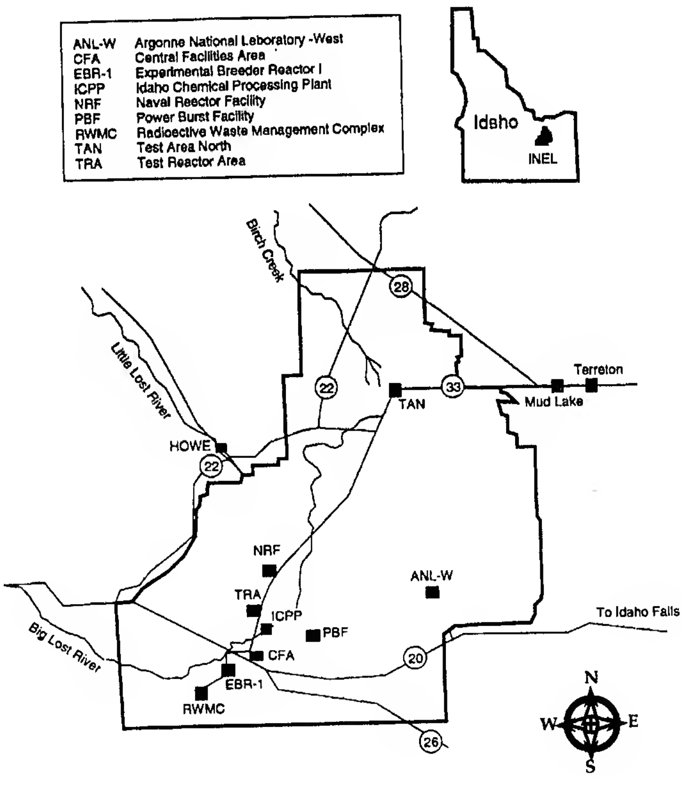
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration:		Fiscal Year
	Begin	1998
	Complete Decommissioning Activities	1999
Waste Management:		Fiscal Year
	Begin	1998
	Centralized Waste Handling Facility Complete	1999
	Remote MW Treatment Facility—Complete Options Analysis	1996

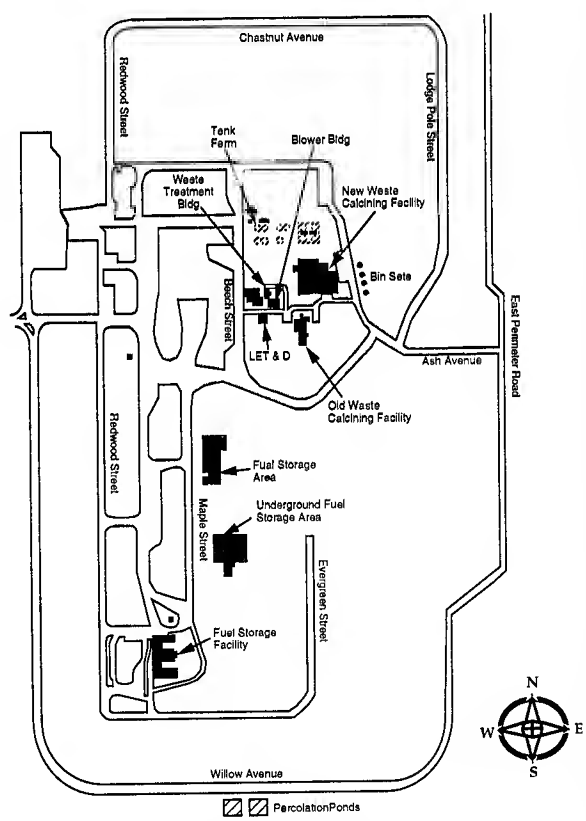
For further information on this site, please contact: *Public Participation Office* (708) 252-8796
Public Affairs Office (708) 252-2010
Technical Liaison: Michael Ferrigan (708) 252-2570

IDAHO NATIONAL ENGINEERING LABORATORY
IDAHO CHEMICAL PROCESSING PLANT

The Idaho National Engineering Laboratory occupies 890 square miles in a remote desert area in southern Idaho along the western edge of the Eastern Snake River Plain. There are no permanent residences within its borders, and the nearest major community, the City of Idaho Falls, is located 42 miles to the southeast. The Laboratory consists of 10 major operating areas at the site and several facilities in the City of Idaho Falls. One area has been designated a National Historic Landmark.



LOCATION OF SITES ON INEL



IDAHO CHEMICAL PROCESSING PLANT SITE MAP

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	96,467	93,252	93,518	63,616	59,806	61,558
Waste Management	199,300	215,300	233,900	253,200	246,900	246,000
Nuclear Material and Facility Stabilization	38,400	45,800	47,000	47,520	48,660	49,360
Directly Appropriated Landlord	95,900	105,300	107,700	106,680	108,440	108,040
Program Management	32,039	32,432	35,252	34,001	37,844	32,591
Total	462,106	492,084	517,370	505,017	501,650	497,549

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	73,268	74,827	88,233	88,735	88,530	87,084	86,965
Waste Management	215,348	324,107	384,470	335,984	343,274	319,574	408,723
Nuclear Material and Facility Stabilization	42,745	27,006	8,669	265	93	90	4
Directly Appropriated Landlord	97,804	93,100	93,100	93,100	93,100	81,780	97,000
Program Management	31,601	42,580	47,552	47,598	48,206	47,209	54,666
Total	460,765	561,620	622,025	565,682	573,202	535,736	647,357

	2035	2040	2045	2050	2055	2060	2065
Environmental Restoration	86,896	69,517	0	0	628	1,999	2,833
Waste Management	395,666	240,215	212,511	193,277	2,517	483	474
Nuclear Material and Facility Stabilization	4,397	27,288	48,787	46,756	25,594	1,060	0
Directly Appropriated Landlord	86,860	49,920	46,660	35,780	6,325	3,000	3,000
Program Management	50,927	34,565	18,678	17,074	330	520	639
Total	624,746	421,505	326,635	292,887	35,395	7,062	6,946

	2070	2075	2080	2085	2090	2095	2100	Life Cycle***
Environmental Restoration	2,292	1,516	1,559	935	0	0	0	3,852,348
Waste Management	127	3	1	1	1	1	0	17,099,130
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	1,206,508
Directly Appropriated Landlord	3,000	3,000	3,000	1,800	0	0	0	4,554,446
Program Management	561	360	400	240	0	0	0	2,250,131
Total	5,980	4,879	4,960	2,976	1	1	0	28,962,566

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

In the 1940's, large portions of the site were used by the Navy for aerial bombing practice, testing naval artillery and bunkers for storing explosives, and ordnance disposal. In 1949, the Atomic Energy Commission established the National Reactor Testing Station, the predecessor of the Idaho National Engineering Laboratory. Eventually, the site contained the largest concentration of nuclear reactors in the world, including the first reactor in the world to generate usable amounts of electricity. Most of the reactors were phased out after completing their research missions, and only the Advanced Test Reactor is currently operating. One of the major facilities at the site, the Idaho Chemical Processing Plant, was used for many years to reprocess spent nuclear fuel by employing a chemical separation technique to recover fissile materials to be used as fuel by the Savannah River Site reactors. In the mid-1950's, the National Reactor Testing Station began receiving and storing radioactive waste generated at other sites operated by the Department of Energy (DOE). In the mid-1970's, the site was renamed the Idaho National Engineering Laboratory.

The Idaho National Engineering Laboratory is now a diversified national laboratory with expertise in advanced engineering technology. Its diverse missions include conducting research and testing on the safety of nuclear reactors; developing, demonstrating, and using engineering technology and systems to improve the national security and nuclear defense as well as the production and use of energy; environmental restoration; developing and testing technologies for the storage of spent nuclear fuel and highly radioactive waste; providing storage for certain types of radioactive and chemical waste from other U.S. defense facilities; and managing the low-level radioactive waste generated and disposed of at the site.

The Idaho National Engineering Laboratory was designated a National Environmental Research Park in 1975. All land within the Laboratory is protected as an outdoor laboratory for the study of ecological relationships and the response of the ecosystem to technological research and development as well as agricultural uses.

ENVIRONMENTAL RESTORATION

Environmental restoration activities at the Idaho National Engineering Laboratory are designed to identify and evaluate potentially contaminated areas, devise cleanup strategies, and carry out cleanup as needed. In addition, environmental activities include the decommissioning of selected facilities at the Laboratory.

The program is conducted within the frame work of the Federal Facility Agreement/ Consent Order with both the U.S. Environmental Protection Agency (EPA) and the State of Idaho. This entails preparing an assessment and proposed remediation plan for the site; submitting the plan for comment to various stakeholders (e.g., the State, Federal agencies, and interested members of the public); and then identifying in a "record of decision" which of the alternatives described in the plan had been selected as the appropriate course of action for a particular area. The record of decision thus reflects input from the stakeholders and has the concurrence of the State as well as EPA.

For purposes of environmental restoration, the Laboratory has been divided into 10 "waste area groups" composed of operable units; the

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Oecamissianing	8,622	29,576	8,214	1,633	1,238	188	69
Waste Area Group 1	11,858	381	4	0	0	0	0
Waste Area Group 10	7,274	4,523	2,252	2,244	3,492	0	0
Waste Area Group 2	864	112	112	112	90	0	0
Waste Area Group 3 (ICPP)	3,029	11,044	1,372	2,198	510	0	0
Waste Area Group 4	2,921	246	0	0	0	0	0
Waste Area Group 5	1,361	854	0	0	0	0	0
Waste Area Group 7 - Other RWMC	6,228	28,091	76,279	82,548	83,199	86,896	86,896
Waste Area Group 7 - Pit 9	31,110	0	0	0	0	0	0
Total	73,268	74,827	88,233	88,735	88,530	87,084	86,965

	2035	2040	2045	2050	2055	2060	2065
Decamissianing	0	0	0	0	0	795	1,524
Waste Area Group 1	0	0	0	0	0	0	0
Waste Area Group 10	0	0	0	0	0	0	0
Waste Area Group 2	0	0	0	0	0	0	0
Waste Area Group 3 (ICPP)	0	0	0	0	628	1,204	1,309
Waste Area Group 4	0	0	0	0	0	0	0
Waste Area Group 5	0	0	0	0	0	0	0
Waste Area Group 7 - Other RWMC	86,896	69,517	0	0	0	0	0
Waste Area Group 7 - Pit 9	0	0	0	0	0	0	0
Total	86,896	69,517	0	0	628	1,999	2,833

	2070	2075	2080	2085	2090	2095	2100	Life Cycle**
Oecamissianing	2,030	1,516	1,559	935	0	0	0	298,121
Waste Area Group 1	0	0	0	0	0	0	0	73,075
Waste Area Group 10	0	0	0	0	0	0	0	106,201
Waste Area Group 2	0	0	0	0	0	0	0	7,311
Waste Area Group 3 (ICPP)	262	0	0	0	0	0	0	110,807
Waste Area Group 4	0	0	0	0	0	0	0	18,756
Waste Area Group 5	0	0	0	0	0	0	0	12,436
Waste Area Group 7 - Other RWMC	0	0	0	0	0	0	0	3,038,979
Waste Area Group 7 - Pit 9	0	0	0	0	0	0	0	186,661
Total	2,292	1,516	1,559	935	0	0	0	3,852,348

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

latter are multiple locations grouped together by similar contamination problems or boundaries. In general, the operable units within each waste area group are independent of each other, but operable units can have overlapping problems.

Since 1986, 450 potentially contaminated areas have been identified, and these areas involve 103 operable units. It is assumed all major sites requiring remediation have been identified, but continuing investigations may lead to the discovery of additional areas. Each operable unit is carefully monitored whether or not remediation has begun. Environmental restoration at each waste area group begins with an assessment of the area to determine the nature and extent of contamination and the potential risk to human health and safety or the environment. Once the cleanup requirements for a particular group are understood, environmental remediation begins and is carried out to completion.

For scoping purposes, future land use is assumed to be industrial and DOE-controlled based on studies conducted by DOE that concluded no residential uses are likely within the next 100 years at the Idaho National Engineering Laboratory.

Environmental restoration activities include planning for the treatment, storage, and disposal of waste generated by environmental restoration. Waste that can be treated or stored will be transferred to waste management activities. For waste that cannot be treated, stored, or disposed of at the site, planning for disposal and payment for packaging will be the responsibility of environmental restoration.

Waste Area Group 1: Test Area North

Waste Area Group 1 covers 125 acres and consists of 6 industrial areas at Test Area North that include the Technical Support Facility, Water Reactor Research Test Facility, Cask Testing Project, Loss-of-Fluid Test Facility, Initial Engine Test Facility, and Specific Manufacturing Capability Facility. In the past, the largest program at Test Area North was the Loss-of-Fluid Test Reactor. Constructed in 1965-1975 and now closed, it was a scaled-down version of a commercial pressurized-water reactor. It was used to perform more than 40 loss-of-coolant experiments simulating reactor accidents. Today, the largest project in Test Area North is the Specific Manufacturing Capability Project, which develops and produces armor for U.S. Army tanks. In addition, a variety of research programs remain active.

This group is divided into 11 operable units, including underground storage tanks, pits, evaporation ponds, and a railroad turntable. It contains 71 potential release sites at which hazardous, radioactive, and mixed waste (i.e., waste that contains both radioactive materials and hazardous chemicals) are present. Possible contaminants include asbestos, petroleum products, acids and bases, radioactive rubble and water, laboratory bottles, and sanitary waste. Both ground-water and soil remediation will be conducted in this waste area group.

The only site in this group where contaminants are clearly migrating is the ground-water contamination site under Test Area North. All other sites are not expected to have contamination deeper than 25 feet. Definitive information on the extent and magnitude of contamination will be gathered over the next three years.

Waste Area Group 2: Test Reactor Area

Waste Area Group 2 is associated with the Test Reactor Area that contains two shutdown reactors. These reactors are the Materials Test Reactor, a 40-megawatt light-water reactor that operated between 1952 and 1970, and the Engineering Test Reactor, a 175-megawatt

pressurized light-water reactor that operated between 1957 and 1982. Today, the Test Reactor Area houses extensive facilities for studying the effects of radiation on materials, fuels, and equipment. One of these, the Advanced Test Reactor, is used to test materials under reactor conditions and to produce radioisotopes for medicine, research, and industry.

Waste Area Group 2 is divided into 13 operable units consisting of 51 potential release sites. These sites include leaching ponds, underground storage tanks, rubble piles, cooling towers, an injection well, french drains, and assorted spills that may have released hazardous and radioactive waste. Possible contaminants include petroleum products, acids, alkalies, polychlorinated biphenyls (PCBs), radioactive materials, and heavy metals. However, the extent of soil contamination at the Test Reactor Area is not completely defined.

The strategy for cleaning up the soils in this group focuses on excavating the contaminated soils, consolidating them in a specified location, and covering them with a soil or clay cap to prevent wind-blown contamination. For potential uses of this area in the future, the record of decision specifies that residential uses may be permitted in 125 years, following the deployment of institutional controls and ground-water monitoring.

Waste Area Group 3: Idaho Chemical Processing Plant

Waste Area Group 3 conducts environmental cleanup at the Idaho Chemical Processing Plant, which had been used for reprocessing spent reactor fuel to recover plutonium and uranium for nuclear weapons. The plant is now a receiving-and-packaging facility for Government-owned nuclear fuels from research and defense reactors. Its other function is to develop technologies for the treatment and storage of high-level radioactive waste and spent nuclear fuel.

The Idaho Chemical Processing Plant is divided into 14 operable units consisting of 83 potential release sites. Contaminants include organic chemical compounds, radioactive materials, metals, corrosives, petroleum waste, and mixed waste.

Most of the known contamination at the Idaho Chemical Processing Plant is below the surface of the soil. The full extent cannot be determined until detailed characterization studies are completed; however, from what is known about the practices and the chemical processes used at the plant, the quantity of contaminated material is estimated to be approximately 66,662 cubic yards of contaminated soil and 8,500 gallons of contaminated liquid. Definitive information on extent and magnitude will be gathered over the next three years.

Remediation treatments for the Idaho Chemical Processing Plant include installing a soil cap to prevent contaminated soils from being dispersed by the wind or retrieval and treatment to reduce the volume. Institutional controls to limit access in the future may also be necessary.

Waste Area Group 4: Central Facilities Area

Many technical and support services for the Laboratory are located at the Central Facilities Area. These services include environmental monitoring and calibration laboratories, hazardous waste storage, communications, security, fire protection, warehouses, vehicle and equipment pools, and bus operations.

This group is divided into 13 operable units consisting of 45 potential release sites. These sites include spills, underground storage tanks, a landfill, evaporation ponds, leach fields, and leach pits. Potential contaminants include chemicals, solvents, PCBs, asbestos, radionuclides, unexploded ordnance, heavy metals, and construction debris. The

contamination is believed to be contained within the boundaries of Waste Area Group 4. Remediation treatments for this group are focused on soils.

Waste Area Group 5: Power Burst Facility and Auxiliary Reactor Areas

Two reactors are present in this area. One is the Power Burst Facility, once used as the severe-damage testing ground for commercial-reactor fuels. This reactor has been leased to the Idaho Brain Tumor Center and will be used to treat brain tumors with neutron radiation. The other reactor is the Special Power Excursion Reactor Test IV facility built in 1960 to provide a prototype for testing the safety of water-pool reactors. This facility was placed on standby status in 1970.

Also located near the Power Burst Facility is the Waste Experimental Reduction Facility, which uses various volume-reduction methods to treat low-level radioactive waste generated at the Idaho National Engineering Laboratory; a storage facility for mixed waste; and a storage facility for hazardous and mixed waste. The latter are referred to collectively as the Waste Reduction Operations Complex.

There are three auxiliary reactor areas. Auxiliary Reactor Area I was constructed in the late 1950's to provide support facilities for various Laboratory programs and was active until the spring of 1988. Auxiliary Reactor Area II housed the Stationary Low Power Reactor No. 1, which was operated by the Army between August 1958 and December 1961. The reactor was destroyed in an accident on January 3, 1961. After cleanup, the three main buildings were converted into offices and welding shops. These facilities have not been used since 1986. Area III was the site of a plant used between 1960 and 1965 to test gas-cooled reactors for the Army. After 1966, the plant served as a laboratory for testing reactor components and instruments. The facility has not been used since 1988.

Waste Area Group 5 is divided into 13 operable units with 48 potential release sites. These sites include evaporation ponds, sanitary sewers, waste sumps, a waste-burial ground, and storage tanks. Potential contaminants are petroleum products, hazardous waste, radioactive materials, metals, radioactively contaminated soil, rubble, and debris.

The extent of soil and ground-water contamination is not defined. Several sites are scheduled to undergo remedial activities by decommissioning and will be characterized or verified as cleaned up by that program, while others are scheduled to be characterized and assessed for potential risks under the environmental restoration activity. Remediation treatments for this group will be focused on soils.

Waste Area Group 6: Experimental Breeder Reactor-I and the Boiling Water Reactor Experiment Area

Waste Area Group 6 consists of the Experimental Breeder Reactor-I and the Boiling Water Reactor Experiment Facility. Both of these were test reactors that have since been decommissioned. Experimental Breeder Reactor-I is now a National Historic Landmark. It was the first nuclear reactor in the world to generate usable amounts of electricity. The area of the Boiling Water Reactor Experiment housed five reactors, which operated between 1953 and 1964. These facilities were decommissioned between 1979 and 1992. The buildings and equipment were completely dismantled and removed, and no operations

other than monitoring are conducted. Potential contaminants from past operations are organic and inorganic chemicals, radioactive materials, and metals.

Waste Area Group 6 consists of 5 operable units with 20 potential release sites, including the burial site for the Boiling Water Reactor Experiment-I, a trash dump, fuel-oil tanks, septic tanks and a leach pond, and soils contaminated with petroleum and radioactive materials.

The extent of soil and ground-water contamination is not completely defined, although ground-water contamination is not expected to be a problem. No further studies are planned for the near term, and there is no cleanup strategy at present.

Waste Area Group 7: Radioactive Waste Management Complex

The Radioactive Waste Management Complex was established in 1952 as a controlled area for the disposal of solid radioactive waste generated by the Idaho National Engineering Laboratory and other sites operated by DOE. Since 1954, the facility has received defense waste for storage.

This waste-group area contains the largest environmental restoration project at the Laboratory, cleanup of the Subsurface Disposal Area. This area began to be used for the burial of solid radioactive waste in 1952. In 1953, the Atomic Energy Commission decided solid radioactive waste from the Rocky Flats Plant in Colorado would be sent to Idaho for disposal. The first shipment from Rocky Flats was received in crates and drums in 1954. Until 1969, the waste was dumped into pits and trenches. Today, the Subsurface Disposal Area is a fenced area surrounded by a flood-control dike and a drainage channel.

In 1970, retrievable interim storage was established for transuranic waste and for alpha-emitting low-level waste formerly categorized as transuranic waste. Transuranic waste is contaminated with long-lived radionuclides (e.g., plutonium) and, therefore, requires permanent disposal in a geologic repository, which was not planned for Idaho. Received in steel drums or boxes, this waste was stacked on asphalt pads in the Transuranic Storage Area while awaiting shipment to a repository.

Five operable units have been identified at this complex, including the Transuranic Storage Area and the Subsurface Disposal Area. All investigations and decisions are scheduled to be completed by 1999. The extent of contaminant migration from various operable units is currently being determined. Both organic materials and transuranic radionuclides have been detected among migrating contaminants.

The Subsurface Disposal Area is a confirmed release site. Environmental monitoring has shown transuranic radionuclides have migrated to the 110-foot sedimentary interbed beneath the Radioactive Waste Management Complex. Trace organic compounds have been detected in the Snake River Plain Aquifer, which is located 600 feet below the surface at this location. The retrieval of transuranic and alpha-emitting low-level waste from the Subsurface Disposal Area accounts for the significant cost estimated for environmental restoration in the years beyond 2005.

Five records of decision are planned for the Subsurface Disposal Area. The planned technology to be used on the organic contaminants in the unsaturated zone is vapor vacuum and extraction. The cleanup strategy for five operable units — transuranic pits and trenches, nontransuranic pits and trenches, radioactive metals in the unsaturated zone, soil vaults, and the acid pit — will be considered in another record of decision. It is expected these

areas will be stabilized and capped with clay after potential "hot spots" from the transuranic and nontransuranic pits and trenches have been removed and treated.

The cleanup strategy for six other operable units (e.g., releases from the Transuranic Storage Area and septic tanks) will be considered under the comprehensive record of decision for the entire waste area group. It is expected no action will be deemed necessary.

Major cleanup efforts are underway for the pre-1970 buried transuranic waste at Pit 9 and the Pad A retrievable transuranic waste storage area. The baseline plans for Pad A are to perform a limited action consisting of recontouring and monitoring. Proof-of-process tests have been conducted for 2 processes involving physical separation and chemical extraction for materials contaminated with transuranic radionuclides at concentrations greater than 10 nanocuries per gram of waste. Storage for waste generated by the Pit 9 project will be provided in the Transuranic Storage Area. Test results will support a 1996 decision on full-scale retrieval and treatment of Pit 9 pre-1970 transuranic waste.

Waste Area Group 8: Naval Reactors Facility

Waste Area Group 8 is the Naval Reactors Facility that contains prototype naval reactors used for research and development and for training naval personnel. Due to its ongoing national security mission, costs for Waste Area Group 8 have not been evaluated for this report. It is assumed Waste Area Group 8 will remain within the jurisdiction of the Department's Office of Naval Reactors for the foreseeable future.

Waste Area Group 10: Miscellaneous Areas

Waste Area Group 10 includes areas in and around the Laboratory that cannot be accommodated by the other defined groups. They include the regional Snake River Plain Aquifer and other surface disposal sites and ponds not included in the other groups. The boundaries of Waste Area Group 10 are Laboratory boundaries or beyond, as necessary to encompass real or potential environmental impacts.

This group consists of 12 specifically identified and 4 generally identified sites divided into 7 operable units. Specific sites include the Liquid Corrosive Chemical Disposal Area located between Waste Area Groups 6 and 7, the Organic Moderated Reactor Experiment leach pond located between Waste Area Groups 4 and 5, and former ordnance areas (including the old naval ordnance disposal area) located at numerous sites within the Idaho National Engineering Laboratory.

Remediation treatments for this group are focused on the soils. Remedial actions are also proposed to reduce potential hazards from unexploded ordnance.

Decommissioning

The environmental restoration activity is also responsible for the decommissioning of selected Laboratory facilities. These activities entail the safe caretaking of radioactively contaminated surplus facilities after they have been shut down. Facilities are either decontaminated for reuse or, if they pose a potential threat to human health and the environment, completely demolished and removed. Specific activities include assessing the size and scope of the problem, deciding on the approach, dismantling equipment, decontaminating or demolishing structures, removing contaminated soils if needed, and recontouring and reseeding the site.

Described below are the units designated surplus facilities and scheduled for decommissioning.

Army Reentry Vehicle Facility

The Army Reentry Vehicle Facility consisted of an earth-covered bunker, a test pit, and a lean-to shed covering the test pit. The test pit was contaminated with low-level beta and gamma radiation. The test pit and lean-to shed were dismantled and removed in 1989, but a dumpster in the bunker contains four drums of mixed waste that consists of radioactively contaminated sodium-potassium liquid metal. In addition to being radioactive, this waste is hazardous because it is reactive with air; it will therefore require treatment by a special chemical process. Once the waste has been removed, the bunker will be demolished and the site returned to its original condition. This project is scheduled to be completed in FY 1997.

Auxiliary Reactor Area I

Dismantling is scheduled for building ARA-626, building ARA-627, the hot cells, the septic systems, and all other structures in this area, which will be restored to its original state. The extent of the contamination existing in associated soil areas around these structures is generally not well characterized. The schedule calls for completion in FY 1997.

Auxiliary Reactor Areas II and III

The facility of interest in Area I is the Stationary Low Power Reactor No. 1, which was destroyed in an accident on January 3, 1961. After a thorough cleanup, the three main buildings were converted into offices and welding shops, but these facilities have not been used since 1986. The buildings are being dismantled, and all area utilities are being removed. The equipment used for cleaning up the reactor has been decommissioned. Though most of the contamination is confined within two steel-framed buildings and one cinder-block building, some of the soils around the buildings are contaminated.

Auxiliary Reactor Area III housed a facility for testing gas-cooled reactors for the Army. After 1966, the facility served as a laboratory for component and instrument testing. It has not been used since 1988. Decommissioning will entail removing the exhaust stack, piping, the hot-waste tank and lines, concrete, and miscellaneous items in the reactor buildings. Once this has been done, all buildings except one will be released for unrestricted use. The project will be completed in FY 1997.

Materials Test Reactor

The Materials Test Reactor, shut down since 1970, is a complex of 18 buildings and structures. Some of these facilities have been decontaminated and are being used for other Laboratory programs. The reactor vessel is still in place, all coolant has been drained, and auxiliary portable shielding has been emplaced to reduce external radiation. The reactor vessel and its supports are heavily contaminated with radioactivity. Contamination is primarily contained within 15 buildings and structures, an exhaust stack, and retention tanks. All of these contaminated areas are periodically surveilled and maintained as necessary. The extent of contamination in surrounding soils is generally not well known at present. The project is scheduled to be completed in FY 2003.

Contaminated-Clothing Laundry in the Central Facilities Area

Building CFA-669 was formerly used as a laundry for clothing contaminated with both radioactive and nonradioactive materials. This building is being dismantled, and its decommissioning will be completed in FY 1995. Contamination is largely confined to one cinder-block building.

Engineering Test Reactor

The Engineering Test Reactor, shut down in 1982, is a complex of 11 buildings and structures. Some of these structures have been decontaminated and are being used for other Laboratory programs. The reactor vessel is still in place, but all coolant has been drained. Its decontamination poses problems similar to those identified for the Materials Test Reactor. Contamination is largely confined within eight structures, four hold tanks, and one exhaust stack. However, the extent of contamination in the surrounding soils is not well defined at present. The project is scheduled to be completed in FY 2005.

Boiling Water Reactor Experiment Facility

The Boiling Water Reactor Experiment facility housed four separate experimental reactors that operated between 1953 and 1964. The facility has not been used since 1964. Decommissioning was conducted in FY 1979, 1984-1987, and 1989-1992; activities included total dismantlement, removal, and disposal of the equipment and buildings. The foundations of the turbine building were decontaminated, demolished to below grade, and left in place. The three underground storage tanks were removed and disposed of. The raw water system, electrical substation, and security fence will be removed and disposed of when decommissioning of the reactor building is completed. Contamination is primarily confined to the belowground reactor building and the subreactor room sump. The site will be restored and seeded with native grasses and will be available for reuse. All these activities will be completed by October 1996.

Special Power Excursion Reactor Test IV

The Special Power Excursion Reactor Test IV facility has been in standby status since 1970. Decommissioning was completed in FY 1993. Work that remains to be completed includes removing and preparing for disposal the mixed waste contained in a holdup tank, dismantling and removing the tank and its piping, removing and disposing of contaminated soil, recycling noncontaminated piping, backfilling the trenches, and recontouring and reseeding the area. Contamination is primarily confined to a 60,000-gallon waste holding tank and 450 feet of 6-inch black iron pipe. Small areas of contaminated soil are also present.

Ancillaries for the Loss-of-Fluid Test Facility

The Loss-of-Fluid Test Facility has already been decommissioned, and most of the ancillary equipment has already been removed from the various facilities at the Test Area North in which it was stored. The work remaining to be done is dismantling the mobile test facility and disposing of the low-level radioactive waste thus generated. The project is scheduled for completion in FY 1998.

Decontamination Shop in Test Area North

The TAN-607 decontamination shop was used for decontaminating tools and small equipment from Laboratory and non-Laboratory facilities. It was shut down in 1987. Recommendations for decommissioning actions include the removal of all contaminated equipment, including tanks and piping, and decontaminating the space within the larger TAN-607 facility to make the area available for reuse. Characterization of the shop was completed in FY 1994. Contamination was found to be largely confined to the tanks and piping.

Test Train Assembly Facility

This facility, located in the basement of the Materials Test Reactor building, was used to build and disassemble nuclear fuel assemblies tested at the Power Burst Facility. Decontamination will remove and treat radioactively contaminated shielding water and

remove the residual radioactive contamination from the canal walls, floor, and associated equipment. Some of the areas have been decontaminated and are being used for other Laboratory programs.

Fuel removal was scheduled to start in FY 1994, and decontamination will be completed in FY 1999.

Idaho Chemical Processing Plant

Although the Idaho Chemical Processing Plant remains an active facility, several of its areas are in transition: they are either being considered for decommissioning or being reviewed for new uses. However, decisions on actual dispositions have not been made. The affected facilities are briefly described below.

The Waste Calcining Facility was originally constructed for technology demonstration; however, the facility was used to calcine liquid high-level waste until the New Waste Calcining Facility was constructed. Decommissioning is scheduled to start in FY 1998, and some preliminary activities have already begun. Plans for decommissioning are preliminary; and call for removing the aboveground structure, process equipment, and utilities and sealing the below ground structure.

The CPP-603 Fuel Storage Facility provided spent-fuel storage from the early 1950's until the CPP-666 Fuel Storage Basin was built in 1985. Though it continues to store spent fuel, this facility is being phased out. Assessment and characterization for decommissioning are scheduled to start in FY 1997.

The CPP-640 Headend Processing Facility was used for processing stainless-steel and graphite spent fuel are no longer needed. Assessment and characterization for decommissioning will start in FY 1996.

The CPP-709 and CPP-734 Service Waste Monitoring Facilities were used for many years to monitor the service-waste discharges, these facilities have been replaced with updated facilities and equipment. They are scheduled for assessment in FY 1995. Decommissioning are scheduled to begin the same year.

The CPP-601 and CPP-631 Fuel Processing Complex has been in continuous operation since the early 1950's and, though still in limited use, is being phased out. Assessment and cleanup for CPP-631 are scheduled for completion in FY 1996. Assessment and decontamination for CPP-601 are scheduled to start in FY 1996.

The Tank Farm for High-Level Liquid Waste is under assessment and characterization for the decommissioning of this facility which is scheduled to begin in FY 1996. Preliminary plans call for removing all aboveground structures and utilities and sealing the tanks in place.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Facility Oecommissioning							
Facility Oecommissioning	8,622	29,576	8,214	1,633	1,238	188	69
Waste Area Group 1							
Assessment	552	0	0	0	0	0	0
Remedial Actions	11,306	381	4	0	0	0	0
Waste Area Group 2							
Assessment	397	0	0	0	0	0	0
Remedial Actions	466	112	112	112	90	0	0
Waste Area Group 5							
Assessment	700	0	0	0	0	0	0
Remedial Actions	661	854	0	0	0	0	0
Waste Area Group 10							
Assessment	2,115	360	0	0	0	0	0
Remedial Actions	5,159	4,164	2,252	2,244	3,492	0	0
Waste Area Group 3 (ICPP)							
Assessment	1,278	204	0	0	0	0	0
Remedial Actions	1,751	10,839	1,372	2,198	510	0	0
Facility Oecommissioning	0	0	0	0	0	0	0
Waste Area Group 4							
Assessment	597	0	0	0	0	0	0
Remedial Actions	2,324	246	0	0	0	0	0
Waste Area Group 7 - Other RWMC							
Assessment	2,558	204	206	206	395	0	0
Remedial Actions	3,670	27,886	76,072	82,342	82,804	86,896	86,896
Waste Area Group 7 - Pit 9							
Remedial Actions	31,110	0	0	0	0	0	0
Total	73,268	74,827	88,233	88,735	88,530	87,084	86,965

	2035	2040	2045	2050	2055	2060	2065
Facility Oecommissioning							
Facility Decommissioning	0	0	0	0	0	795	1,524
Waste Area Group 1							
Assessment	0	0	0	0	0	0	0
Remedial Actions	0	0	0	0	0	0	0
Waste Area Group 2							
Assessment	0	0	0	0	0	0	0
Remedial Actions	0	0	0	0	0	0	0
Waste Area Group 5							
Assessment	0	0	0	0	0	0	0
Remedial Actions	0	0	0	0	0	0	0
Waste Area Group 10							
Assessment	0	0	0	0	0	0	0
Remedial Actions	0	0	0	0	0	0	0
Waste Area Group 3 (ICPP)							
Assessment	0	0	0	0	0	0	0
Remedial Actions	0	0	0	0	0	0	0
Facility Decommissioning	0	0	0	0	628	1,204	1,309
Waste Area Group 4							
Assessment	0	0	0	0	0	0	0
Remedial Actions	0	0	0	0	0	0	0
Waste Area Group 7 - Other RWMC							
Assessment	0	0	0	0	0	0	0
Remedial Actions	86,896	69,517	0	0	0	0	0
Waste Area Group 7 - Pit 9							
Remedial Actions	0	0	0	0	0	0	0
Total	86,896	69,517	0	0	628	1,999	2,833

Environmental Restoration Activity Costs (contd.)

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	2070	2075	2080	2085	2090	2095	2100	Life Cycle**
Facility Decommissioning								
Facility Decommissioning	2,030	0	1,559	935	0	0	0	298,121
Waste Area Group 1								
Assessment	0	0	0	0	0	0	0	3,312
Remedial Actions	0	0	0	0	0	0	0	69,763
Waste Area Group 2								
Assessment	0	0	0	0	0	0	0	2,384
Remedial Actions	0	0	0	0	0	0	0	4,926
Waste Area Group 5								
Assessment	0	0	0	0	0	0	0	4,200
Remedial Actions	0	0	0	0	0	0	0	8,236
Waste Area Group 10								
Assessment	0	0	0	0	0	0	0	14,489
Remedial Actions	0	0	0	0	0	0	0	91,712
Waste Area Group 3 (ICPP)								
Assessment	0	0	0	0	0	0	0	8,687
Remedial Actions	0	0	0	0	0	0	0	85,106
Facility Decommissioning	262	0	0	0	0	0	0	17,014
Waste Area Group 4								
Assessment	0	0	0	0	0	0	0	3,580
Remedial Actions	0	0	0	0	0	0	0	15,176
Waste Area Group 7 - Other RWMC								
Assessment	0	0	0	0	0	0	0	20,411
Remedial Actions	0	0	0	0	0	0	0	3,018,568
Waste Area Group 7 - Pit 9								
Remedial Actions	0	0	0	0	0	0	0	186,661
Total	2,292	0	1,559	935	0	0	0	3,852,348

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Technical Support Facilities in the Test Area North

The support facilities consist of buildings, structures, pits, and equipment used to support various activities at the Test Area North. Two facilities, the TSF-606 calibration well in building TAN-606 and the TAN-616 Liquid Waste Treatment Facility, have been identified as candidates for decommissioning. Assessment and characterization for these facilities were started in FY 1993, but methods for decontamination have not been determined. Both facilities are to be decommissioned by FY 2002.

WASTE MANAGEMENT

Waste management is a major program at the Idaho National Engineering Laboratory, which treats and stores various waste, including radioactive waste, chemical waste, mixed waste that is both radioactive and chemically hazardous, and industrial waste. In addition, for many years the Laboratory has received radioactive waste from other sites operated by DOE, the most notable being transuranic waste.

Each type of waste requires a different strategy for management as each has specific

requirements for treatment, storage, and disposal. For low-level radioactive waste, burial in engineered and monitored pits is acceptable. For others, like the large quantities of transuranic waste stored in Idaho, disposal is not available at present; it must await decisions about the safety of a permanent geologic repository — the Waste Isolation Pilot Plant — in New Mexico. If the decision is favorable and timely, shipments from Idaho will start in 1998. Disposal for high-level waste must await the opening of a geologic repository yet to be built and for which a site, though identified, has not yet been approved. No disposal for this waste is expected soon and all of these factors complicate the waste management problem and add to its cost.

The management strategy for each type of waste also depends on the consent orders and agreements DOE has entered into with the State of Idaho and EPA.

Negotiations are now underway with the National Governors Association and the State of Idaho regarding the management and disposal of certain waste — in particular, issues of equity among and between various States, transportation, and disposal.

Site costs are adjusted (negative numbers in the Waste Management tables) to reflect funding transferred to the Idaho National Engineering Laboratory site to account for costs associated with the disposal of environmental restoration activity waste generated at other DOE facilities.

High-Level Radioactive Waste

At the Idaho National Engineering Laboratory, high-level radioactive waste is confined to the Idaho Chemical Processing Plant. The plant generated all of the high-level waste through reprocessing spent fuel for the recovery of uranium and krypton. Since April 1992, the final month of spent nuclear fuel reprocessing at the Idaho Chemical Processing Plant, no high-level liquid waste has been generated with the exception of residual waste from other

Major Waste Management Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995-2000	2005	2010	2015	2020	2025	2030	
IWPF	5,750	40,800	18,080	24,800	16,060	0	0	
LLW Disposal Facility	2,267	10,940	6,640	6,180	6,280	36,200	6,320	
WCSF	10,833	5,000	5,000	5,000	3,400	0	0	
WIF (ICPP)	55,767	108,200	96,600	70,200	53,800	53,800	53,800	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
IWPF	0	0	0	0	0	0	0	533,200
LLW Disposal Facility	6,180	6,280	7,060	3,800	0	0	0	493,000
WCSF	0	0	0	0	0	0	0	157,000
WIF (ICPP)	53,800	53,800	50,400	34,800	0	0	0	3,480,600

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

treatment processes like decontamination. These treatments are expected to generate approximately 538 cubic meters of liquid waste per year over the next 5 years.

Three different types of high-level waste are stored at the Idaho Chemical Processing Plant: high-level liquid waste, sodium-bearing liquid waste, and calcined solid waste. Although the sodium-bearing liquid waste does not meet the definition of high-level waste, it is managed as high-level waste at the plant. The high-level waste is considered to be a mixed waste because of the chemicals it contains. It is therefore subject to the land-disposal restrictions of the Resource Conservation and Recovery Act (RCRA) and is included in the consent order signed with the State of Idaho and EPA. The Department is negotiating with the State to determine best treatment and storage strategies until a repository becomes available. The current strategy is to convert liquid waste to calcined solid waste and then to immobilize the calcine by vitrifying it into borosilicate glass.

Waste Treatment

Liquid high-level waste and sodium-bearing waste are treated at the New Waste Calcining Facility, which converts them to a granular solid. Calcining reduces the volume of the waste at a ratio of 3:1 and changes the waste from a corrosive liquid to a more stable, noncorrosive form.

Other treatment facilities include the Process Equipment Waste Evaporator, which converts liquid waste into high- and low-activity streams. Compared with the original volume, the high-activity fraction is small. This reduction, about 30:1, conserves space in the storage tanks. The evaporator processes about 1.4 million gallons of waste annually, reducing the waste sent to the high-level waste tank farm to about 38,000 gallons.

Finally, the high-level waste must be treated or conditioned to produce a final waste form suitable for permanent disposal. DOE is studying the feasibility of a proposed facility, the Waste Immobilization Facility, designed to separate high-level waste and the sodium-bearing waste into two fractions, one with high-level waste and the other with low-level waste. The low-level waste fraction can be encapsulated in either grout or cement, while the high-level fraction can be vitrified into borosilicate glass. The technologies and facilities for treating and conditioning these wastes, however, have yet to be determined. Plans and schedules for the facility are likely to depend on the requirements of the Federal Facility Compliance Act and the outcome of negotiations with the State of Idaho.

Waste Storage

Liquid and solid high-level wastes have been stored at the Idaho Chemical Processing Plant since the early 1950's and 1960's. The liquid waste is temporarily stored in the stainless-steel tanks of the high-level waste tank farm. It is processed into a solid form (calcine) and then stored in the calcine solids storage facilities.

The current inventories in storage are approximately 1,000 cubic meters of high-level liquid waste, 6,900 cubic meters of sodium-bearing liquid waste, and 3,700 cubic meters of calcine.

The high-level waste tank farm is capable of storing more than 3 million gallons of liquid waste in 11 stainless-steel tanks contained in underground concrete vaults. These tanks were built in the mid-1950's and mid-1960's. Seven calcine storage facilities, including 4 newly constructed, are providing interim storage for approximately 3,700 cubic meters of calcine. Here the solid calcine is stored in stainless-steel bins enclosed within massive aboveground reinforced-concrete vaults with walls 4 feet thick. Each vault contains three to seven bins. Five of these facilities are full, and the sixth is

partially filled. New bins and vaults will be constructed as needed. The stored waste is retrievable, except for the No.1 Calcine Solid Storage Facility. However, DOE is planning to develop and construct a system for retrieving the calcine from this facility.

Since their installation, many modifications and improvements have been made to the storage facilities to improve safety and performance. For example, most of the transfer piping at the tank farm is being replaced with double-encased lines and lined sumps with radiation monitors. Additionally, the tanks have been provided with more-accurate level-measuring equipment.

However, many of the storage facilities need upgrading or replacement to fully meet the requirements of RCRA. Furthermore, insufficient storage space could result in violation of a consent order signed with the State of Idaho. Fines and restrictions on waste generation could result.

Waste Disposal

No high-level waste has been or will be disposed of at the Laboratory. This waste is destined for permanent disposal in a geologic repository.

Spent Nuclear Fuel

The spent fuel currently comes from two active sources, the Naval nuclear program and the Advanced Test Reactor on the Idaho National Engineering Laboratory. Fuel currently stored at Idaho has come from the above sources, other government and university research reactors, and special-case commercial reactors, including the damaged spent fuel and core debris from the Three Mile Island II reactor in Pennsylvania. Furthermore, the Laboratory expects to continue receiving spent fuel from Naval reactors and the Advanced Test Reactor. Depending on the outcome of the Spent Nuclear Fuel Programmatic Environmental Impact Statement Record of Decision, it is possible the Laboratory will receive additional spent fuel from other DOE sites.

All of the spent fuel will be eventually shipped to a geologic repository. Although current plans predict a repository will be available about 2015, it will not accept large quantities of DOE waste during the first several years of operation, and it is unknown when spent fuel from the Laboratory will be accepted. Until that time, the Laboratory will have to provide safe, monitored storage facilities from which the fuel can be readily retrieved when necessary.

Before shipment to the repository, the spent fuel will have to be loaded into multipurpose canisters that can be used for transportation and for permanent disposal. Multipurpose canisters are also suitable for dry storage if extended storage is needed. The life-cycle cost estimate provided assumes that fuel loading into multipurpose cannisters starts in 2025. The Laboratory expects to use 600 multipurpose canisters. With this schedule, the spent fuel at the Laboratory will be loaded and ready to ship by 2035.

Spent fuel is stored at various Laboratory facilities. Most of these facilities provide storage in water-filled, fuel storage basin, but some dry storage is also available. The facilities in which most of the spent fuel is stored are the Idaho Chemical Processing Plant, the Power Burst Facility, and a storage pool at the Test Area North; the latter contains mostly damaged reactor-core debris from the Three Mile Island reactor.

The storage pool at Test Area North was built in the 1950's and is not considered adequate for long-term interim storage. The spent fuel will therefore be removed and transferred to dry storage by FY 2000. The CPP-603 storage pools in the Idaho Chemical Processing Plant and the pool in the Power Burst Facility will also be emptied.

The Department is evaluating the feasibility of consolidating all of the Laboratory-stored spent fuel at the Idaho Chemical Processing Plant. If necessary, the fuel will be repackaged at the plant.

Transuranic Waste

From 1952-1970, approximately 60,000 cubic meters of transuranic waste was buried at the disposal site at the Radioactive Waste Management Complex. Since 1970, 40,000 cubic meters of DOE defense-generated and other transuranic waste have been stored in retrievable storage in a earthen covered berm at the Radioactive Waste Management Complex. Most of this transuranic waste originated from Rocky Flats. Over 60 percent of the DOE complex transuranic waste inventory is at the Idaho National Engineering Laboratory.

Waste Treatment

If necessary for disposal, transuranic waste will be treated at the Idaho Waste Processing Facility or applicable private sector facility, which will repackage the waste or treat wastes that cannot meet transportation criteria or criteria for acceptance at the Waste Isolation Pilot Plant. The latter will affect the design of the Idaho Waste Processing Facility.

The Department is developing a Waste Characterization Facility in which drums of transuranic waste will be opened and the waste will be examined, sampled, characterized and repackaged. The data thus obtained will be used in analyses required to demonstrate compliance with the Waste Isolation Pilot Plant's RCRA permit for disposal. Construction will be completed in July 1998, and operations will start in January 1999. Laboratories for this facility will be provided by upgrading the existing laboratory capability.

Waste Storage

Interim storage for transuranic waste is provided in two air-supported buildings at the Transuranic Storage Area of the Radioactive Waste Management Complex and the soil covered berm. To improve the storage facilities, the Department is constructing seven new engineered storage modules that comply with a consent order with the State of Idaho and the storage requirements of RCRA. The first four modules have been completed, and the rest will be available by August 1995. Additional modules will be constructed as needed. By January 1, 1998, waste currently stored in two air-support buildings will be emplaced in the new storage modules.

A retrieval enclosure is being constructed at the Transuranic Storage Area. It will cover waste stored beneath an earthen and geofabric cover. The enclosure will provide increased protection for the stored waste containers, enhanced containment for contaminated areas, and provide year-round capability for retrieving the stored waste. Construction of the Retrieval Enclosure began in 1993 and is scheduled for completion in 1996. Retrieval operations will commence in 1997 to support shipments to the Waste Isolation Pilot Plant for disposal. Multiple-shift operations will start in FY 2000 to ensure all waste has been retrieved by 2014.

In FY 1997, the Department plans to reactivate the Stored Waste Examination Pilot Plant to production-level operations. The reactivation will depend on the availability of final waste-acceptance criteria from the Waste Isolation Pilot Plant in late FY 1996. Final waste-acceptance criteria from the Waste Isolation Pilot Plant are needed to ensure examined waste can be shipped for disposal. Multiple-shift operations are planned in FY 2000 to ensure waste examination is finished before the Waste Isolation Pilot Plant closes in 2023.

A characterization study of remotely handled transuranic waste began in FY 1994 to provide data needed for the Waste Isolation Pilot Plant.

Shipments of remotely handled transuranic waste to the Waste Isolation Pilot Plant are scheduled to start in FY 2000 and end in FY 2005.

Waste Disposal

The Department expects to start receiving transuranic waste at the Waste Isolation Pilot Plant in 1998 if approval by EPA and the State of New Mexico is granted in a timely manner. In the meantime, the Laboratory is actively supporting the activities needed to achieve a favorable decision on disposal. In particular, it is characterizing the current inventory of accessible transuranic waste, identifying requirements for waste characterization, and developing advanced methods for characterization. The objective is to provide data for the documentation of regulatory compliance and to implement standardized and cost-effective waste-characterization methods at other Department sites with inventories of transuranic waste.

Alpha-Contaminated Low-Level Waste

"Alpha-contaminated low-level waste" or simply "alpha-low-level waste" is low-level radioactive waste that is contaminated with alpha-emitting transuranic radionuclides at concentrations between 10 and 100 nanocuries per gram of waste. Before 1982, this waste was considered to be transuranic waste, which was then defined as waste contaminated with plutonium and other transuranics at concentrations of 10 or more nanocuries per gram of waste. The Idaho National Engineering Laboratory does not allow such waste to be disposed of at the site as low-level waste. Some of this waste may contain hazardous constituents and thus may require management as mixed waste.

Waste Treatment

To develop the needed treatment capability for Alpha low-level waste, the Department is proceeding on two parallel paths. The first path is developing Phase I of the Idaho Waste Processing Facility. Phase I of the Idaho Waste Processing Facility would provide capability to meet legal requirements for chemically hazardous constituents. The second path will evaluate and help develop treatment capabilities in the private sector. The Department has contracts with three private-sector companies for feasibility studies that identify alternative approaches and techniques the private sector might employ to treat alpha-contaminated and transuranic mixed waste. The results of the feasibility studies will then be used to start a phased development of treatment facilities.

A decision about the approach to follow will be made in FY 1997.

Waste Storage

Before 1982, this waste was received from the Rocky Flats Plant and other sources as transuranic waste and was stored in the Transuranic Storage Area pending shipment to a repository. Since the definition of transuranic waste has changed, approximately 45 percent of the 2.3 million cubic feet of waste stored as transuranic waste is expected to be reclassified as alpha-contaminated low-level waste.

Waste Disposal

Final disposal decisions, however, will be based on the results of the negotiations under way by the National Governors' Association. These negotiations are expected to establish one or more locations for the disposal of treated mixed waste, including alpha-contaminated low-level waste, by October 1995. The Department will not start any Idaho-specific work until the consent order under the Federal Facility Compliance Act is signed in October 1995.

Special-Case Waste, Greater-Than-Class-C Waste, and Sealed Radiation Sources

Special-case waste is radioactive waste owned or generated by DOE and does not fit into the management plans developed for the major types of radioactive waste.

Greater-Than-Class-C waste is waste in which the concentrations of certain radionuclides exceed the limits specified by the U.S. Nuclear Regulatory Commission for waste defined as Class C low-level waste. Greater-Than-Class-C waste is generally not acceptable for near-surface disposal. DOE is responsible for providing safe disposal for these wastes in a facility licensed by the U.S. Nuclear Regulatory Commission.

Sealed radiation sources are capsules containing radioactive materials. DOE is responsible for the disposal of such materials if they cannot be reused or recycled and are classified as waste and meet the definition of Greater-Than-Class-C.

All of these waste types will require disposal in a geologic repository. No activities are being conducted at the Laboratory to support the disposal. The effort is focused on storage.

Treatment for special-case waste or Greater-Than-Class-C waste is also not planned. However, some special-case waste could be made acceptable for disposal as low-level waste. Evaluation of this material indicates these structures can be sized for placement into disposal canisters for disposal at the Radioactive Waste Management Complex. The canisters are grouted for shielding purposes, which makes the disposal package acceptable, and a special-case waste stream is eliminated.

Special-case waste is stored in several facilities at the Idaho National Engineering Laboratory, including Argonne National Laboratory-West, the Radioactive Waste Management Complex, the Test Reactor Area, the Idaho Chemical Processing Plant, and Test Area North. Most of these facilities also have some potential special-case waste, as do the Power Burst Facility, the Naval Reactor Facility, and Special Manufacturing Capability facilities.

Preliminary evaluations have been made of the storage requirements for the special-case waste, but more effort is planned for determining the future capacity and configuration needs. This will allow a final decision to be made about storage requirements in Idaho. To facilitate decisionmaking and to manage materials and waste at the Laboratory as effectively and efficiently as possible, activities planned to evaluate storage requirements for sealed sources, special-case waste, and potential Greater-Than-Class-C waste will be coordinated. This will ensure selection of the best storage configuration to meet the requirements of each waste stream or potential waste stream.

Low-Level Waste and Low-Level Mixed Waste

Waste Treatment

Low-Level Waste

About 60 percent of the non-incinerable low-level waste generated at the Idaho National Engineering Laboratory is sent to the sizing and compacting facility to be volume reduced prior to disposal at the Radioactive Waste Management Complex. The remaining 40 percent of the non-incinerable low-level waste is sent directly to the Radioactive Waste Management Complex for disposal. Sizing and compaction operations were resumed in FY 1995. Incinerable low-level waste is currently sent offsite for treatment. The ash is returned for disposal at the Radioactive Waste Management Complex. If incineration is resumed at the Waste Experimental Reduction

Facility for low-level mixed waste, low-level waste will be incinerated at the Waste Experimental Reduction Facility between mixed waste campaigns.

For the purposes of this estimate, low-level waste treatment at the Waste Experimental Reduction Facility is expected to stop in FY 2009, and from 2010 through 2055 all low-level waste treatment (incineration, compaction, and size reduction) is likely to be conducted by the private sector. All residues from these treatments will be returned and disposed of at the Idaho National Engineering Laboratory.

Low-Level Mixed Waste

A major factor in decisions about the treatment and storage of low-level mixed waste in the very near term will be a consent order under the Federal Facility Compliance Act. This order will resolve questions about timing and location for the treatment and storage of all of the Laboratory's low-level mixed wastes.

The low-level mixed waste backlog currently stored at the Waste Experimental Reduction Facility and other facilities at Idaho National Engineering Laboratory will be treated by incineration at the Waste Experimental Reduction Facility or by non-incineration treatment technologies at the Waste Reduction Operations Complex or by the private sector. Lead represents more than 50 percent of the backlog of the low-level mixed waste and is expected to be decontaminated by the private sector. Newly generated low-level mixed waste will be treated by incineration at the Waste Experimental Reduction Facility or by non-incineration treatment technologies at the Waste Reduction Operations Complex or by the private sector.

Low-level mixed waste that does not require repackaging and low-level mixed waste that will allow for the greatest volume reduction will be incinerated first. Repackaging will become available in FY 1998. For selected waste, repackaging at the Waste Experimental Reduction Facility and other facilities operating with RCRA permits may start earlier to expedite the incineration of the mixed waste.

The inventory of low-level mixed waste that requires repacking will either be small enough to allow treatment in the three-year window from FY 1996 to FY 1999, or private sector capabilities will accomodate the excess volume.

Private sector treatment of non-incinerable low-level mixed waste will be available to treat some of the backlog and ongoing Idaho National Engineering Laboratory low-level mixed waste.

At present, private sector capabilities for treating low-level mixed waste are limited, and future private sector capabilities are difficult to quantify. However, the capability to treat low-level mixed waste in the private sector will be periodically assessed.

After December 1997, newly generated low-level mixed waste will be subject to all of the requirements of RCRA. Current allowances under the Federal Facility Compliance Act, such as storing land-disposal-restricted mixed waste for more than a year, will not be available.

To ensure the Idaho National Engineering Laboratory is capable of meeting all RCRA requirements, DOE will start in FY 1996 to determine long-range needs for non-alpha mixed waste treatment for the Laboratory. In FY 1999, DOE will decide whether long-range treatment will be conducted in the Idaho Waste Processing Facility, in the private sector, at the Waste Experimental Reduction Facility, or at some other currently unidentified facility either on or off the Idaho site. This decision will consider the large quantities of low-level mixed waste that could be generated during environmental restoration as well as decommissioning at the Idaho National Engineering Laboratory.

Waste Storage

Low-Level Waste

The low-level waste backlog currently stored at the Waste Experimental Reduction Facility and other facilities on the Idaho National Engineering Laboratory will continue to be stored until the waste can be treated at the Waste Experimental Reduction Facility and at commercial facilities. After processing of the backlog is completed, all newly generated low-level waste will be temporarily stored at generator facilities until it can be shipped directly to the Waste Experimental Reduction Facility. At the Facility, the low-level waste will be treated or staged for shipment to the private sector for treatment. An activity will be initiated in FY 2005 to evaluate long-term storage and staging needs. This activity will develop information to support a decision in FY 2009, to determine the long-range storage and staging needs for private sector processing of the low-level waste. Direct shipment of low-level waste from generators to offsite facilities for processing will be considered in this decision.

Low-Level Mixed Waste

Low-level mixed waste that has been treated, or is awaiting treatment, will be stored at existing storage facilities at the Waste Reduction Operations Complex until FY 2000.

Waste Disposal

Low-Level Waste

The disposal of low-level waste will continue at the Radioactive Waste Management Complex Subsurface Disposal Area until FY 2004. At that time, the Subsurface Disposal Area closure will begin. A new low-level waste disposal facility will be located at the Laboratory at either a new location or at the present site. The location of the new facility has not been determined, but design will be completed in FY 2000. Construction will be completed, and the new facility will be ready to accept low-level waste in 2005.

Low-Level Mixed Waste

The Department will work with the National Governors' Association to select sites that will dispose of treated low-level mixed waste. No Idaho-specific work on site selection or facility design will be completed until after the Federal Facility Compliance Act consent order is signed in October 1995.

Before the signing of the Federal Facility Compliance Act consent order, DOE will continue to evaluate private-sector facilities for the disposal of low-level mixed waste. Where private sector facilities prove to be cost-effective and environmentally compliant alternatives to onsite disposal, DOE will continue to consider their use.

After the Federal Facility Compliance Act consent order is signed, offsite disposal facilities will be readied for the receipt of treated listed low-level mixed waste and treated listed low-level waste. Most low-level waste at the Laboratory is considered a listed mixed waste. Shipment of treated low-level mixed waste and low-level waste to these offsite disposal facilities will begin in FY 1999 and continue as necessary to support Laboratory plutonium-contaminate operations.

Hazardous Waste

A goal of zero generation of hazardous waste has been tentatively set for the year 2010. Decommissioning, environmental restoration, and other legacy waste is not considered newly generated hazardous waste. In addition, any potential hazardous waste recycled is not considered newly generated hazardous waste.

Waste Treatment

Commercial treatment, storage and disposal facilities under contract with the Laboratory will treat and dispose of the Laboratory's hazardous waste in compliance with applicable regulations. The Laboratory ships hazardous waste directly from the generator to an offsite commercial facility for treatment.

Not all hazardous waste generated at the Idaho National Engineering Laboratory is shipped to an offsite treatment storage and disposal facility for disposition. Some Laboratory hazardous waste can be treated in generator treatment plants, particularly "problem" hazardous waste.

Waste Storage

The Waste Reduction Operations Complex provides for onsite transportation and storage of Idaho National Engineering Laboratory hazardous waste. In addition, some generators provide storage for hazardous waste generated at their facilities. The laboratory-generated hazardous waste is shipped directly from generator storage facilities to offsite treatment, storage and disposal facilities.

Hazardous waste that requires storage at the Idaho National Engineering Laboratory is placed in the hazardous waste storage facility. The hazardous waste storage facility, which was constructed in 1943, has provided storage for the Laboratory's hazardous waste for over 8 years. Because of the age of this facility, continual corrective maintenance is required to remain in compliance with regulations.

In the future, hazardous waste is expected to be stored in the Waste Experimental Reduction Facility Waste Storage Building. The existing hazardous waste storage facility will be utilized for storage of problem hazardous waste (i.e., hazardous waste that does not have a treatment identified) and any RCRA time-limited waste until the Waste Experimental Reduction Facility Waste Storage Building modifications have been completed. At that time, around mid-FY 1998, all hazardous waste storage activities will be relocated to the Waste Experimental Reduction Facility Waste Storage Building, and a decision will be made concerning RCRA closure of the hazardous waste storage facility. This decision will be based on the Laboratory's storage needs for RCRA-regulated waste.

Waste Disposal

Hazardous waste is treated and disposed at offsite treatment, storage, and disposal facilities.

Industrial and Commercial Waste

Industrial and commercial waste generated at the Laboratory is sent to the site's landfill for disposal. Industrial and commercial waste is the same as sanitary waste described elsewhere in the report. In addition to solid waste disposal, some treatment processes can be performed at the landfill. For example, some 1,500 cubic yards of petroleum-contaminated soils, gravel, sand, and the like will be treated there annually. The contaminated soils will be landfarmed in a 2-acre area at the landfill. After the soil is treated, it can be used for landfill cover. The treatment area will eventually be used for solid waste disposal. Air emissions from landfarming activities are well below the limits defined by the Clean Air Act.

A wood-recycling program has been established. Scrap lumber is recycled into wood chips to be used as landscaping mulch or to augment landfill cover material. In addition, the wood chips can be compacted in a pelletizer, which is part of a waste-to-fuel program. Since September 1993, more than 21,000 cubic yards of scrap lumber has been converted into mulch instead of being disposed of in the landfill.

A proposed waste-to-fuel program would use scrap lumber chips and paper for compaction in a pelletizer. The pellets would replace the coal

used in onsite boilers. The high-pressure compaction process produces a fuel form that provides energy at a level slightly below that of coal, with considerably less residual ash. A decision about feasibility will be made at the end of FY 1997. If a decision is made to develop this capability, the pelletizer would begin operation at this time.

Industrial wastes are not stored. However, waste collection activities and maintenance of dumpsters constitutes a significant portion of the work required to properly manage Idaho National Engineering Laboratory industrial and commercial waste.

The current Landfill Complex disposal operations are located in a 12-acre gravel removal area at the Idaho National Engineering Laboratory. The Landfill Complex has historically received between 60,000 and 110,000 cubic yards of uncompacted solid waste annually to dispose or recycle as required. The solid waste volume actually disposed in the landfill each year uses 3 to 4 acres of space, assuming no shallow rock beds are encountered that limit the depth of excavation. At this rate, the current 12-acre disposal area of the Landfill Complex will reach capacity in mid-1996. Landfill Complex operations will then be extended into an adjacent 225-acre area that is defined as part of the Landfill Complex in the National Environmental Policy Act documentation.

The 225-acre area will provide industrial and commercial waste disposal capacity for at least 30 years based on the current usage rate and assuming no shallow rock beds are encountered. This rate will be continually evaluated to determine the actual life of the Landfill Complex. In FY 2020, if required, a decision will be made concerning future solid waste disposal needs and capacity. A strategy for providing long-term capability for disposal of solid waste beyond the projected life of the Landfill Complex will be developed as necessary. As sections of the landfill reach capacity, they will be closed and a final cover will be placed over them in compliance with the Conditional Use Permit, at a minimum. Current final coverage practices exceed the assumed requirements of the permit.

Another function performed within the Landfill Complex boundaries is the handling and disposal of asbestos waste. A designated area exists on the west side of Lincoln Road for these activities. Asbestos generated from maintenance projects and decommissioning activities is boxed, placed in the designated disposal area, and disposed.

Underground Storage Tank Program

The Idaho National Engineering Laboratory Tank Management Program includes oversight of all Laboratory tanks. Laboratory tanks have been profiled and categorized according to RCRA regulations. The following tank classes were identified, and a technical approach, priority, and schedule were developed for each tank category:

- Active regulated tank systems nondeferred (gas/diesel) and deferred (emergency generator),
- Active nonregulated tank systems (heating fuel),
- Abandoned/out-of-service petroleum tank systems, and
- Abandoned/out-of-service hazardous/radioactive tank systems (environmental restoration activity).

Using the four categories, a systematic technical approach is in progress to remove, replace, or upgrade Laboratory tanks. As of June 1993, all of the identical abandoned or out-of-service petroleum tank systems had been removed.

In 1991, three active regulated tanks were upgraded and seven active regulated tanks were replaced. In 1992, six regulated tanks were replaced, with followup work on the

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
High-Level Waste	0	1,311	2,400	4,615	0	0	0
Transuranic Waste	6,122	15,089	24,798	29,694	37,031	27,152	20,509
Low-Level Mixed Waste	18,372	18,225	14,946	15,659	15,359	14,995	15,111
Low-Level Waste	0	5,088	5,088	5,088	5,088	6,184	9,323
Storage and Handling							
High-Level Waste	54,482	98,576	92,485	68,302	59,441	62,949	66,825
Spent Nuclear Fuel	52,537	50,211	39,504	36,366	36,182	36,182	35,443
Transuranic Waste	4	603	34,330	36,753	24,599	6,398	2,256
Low-Level Mixed Waste	12,661	19,965	7,854	0	0	0	0
Low-Level Waste	107	471	635	761	916	1,071	1,260
Disposal							
High-Level Waste	0	0	0	0	0	0	0
Spent Nuclear Fuel	0	46,150	88,239	62,764	62,764	62,764	145,649
Low-Level Mixed Waste	573	2,986	2,444	3,007	3,004	2,996	2,990
Low-Level Waste	2,982	6,757	13,172	14,548	14,545	14,537	14,211
Hazardous Waste	15,499	9,297	8,640	8,283	8,283	8,283	8,283
Sanitary Waste	5,199	4,918	4,918	4,918	4,918	4,918	4,918
Other							
Decommissioning	0	0	0	0	25,918	25,918	36,717
Waste Management TSD	47,820	45,227	45,227	45,227	45,227	45,227	45,227
Inter-Site Disposal Assessment							
Low-Level Mixed Waste	-2	-138	-90	0	0	0	0
Low-Level Waste	-1,009	-629	-119	0	0	0	0
Total	215,348	324,107	384,470	335,984	343,274	319,574	408,723

	2035	2040	2045	2050	2055	2060	2065
Treatment							
High-Level Waste	0	0	0	0	0	0	0
Transuranic Waste	3,256	0	0	0	0	0	0
Low-Level Mixed Waste	15,094	15,151	11,573	4,516	730	0	0
Low-Level Waste	6,014	5,088	4,255	749	184	41	41
Storage and Handling							
High-Level Waste	95,623	95,623	95,623	95,623	0	0	0
Spent Nuclear Fuel	35,812	0	0	0	0	0	0
Transuranic Waste	536	6	7	7	0	0	0
Low-Level Mixed Waste	0	0	0	0	0	0	0
Low-Level Waste	1,279	326	328	313	333	384	208
Disposal							
High-Level Waste	23,075	23,075	23,075	23,075	0	0	0
Spent Nuclear Fuel	108,914	0	0	0	0	0	0
Low-Level Mixed Waste	2,380	0	0	0	2	5	0
Low-Level Waste	12,857	10,122	0	0	1	52	225
Hazardous Waste	8,283	8,283	25	417	1,269	0	0
Sanitary Waste	4,918	4,918	0	0	0	0	0
Other							
Decommissioning	32,397	32,397	32,397	32,397	0	0	0
Waste Management TSD	45,227	45,227	45,227	36,182	0	0	0
Inter-Site Disposal Assessment							
Low-Level Mixed Waste	0	0	0	0	0	0	0
Low-Level Waste	0	0	0	0	0	0	0
Total	395,666	240,215	212,511	193,277	2,517	483	474

Waste Management Activity Costs (contd.)

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	2070	2075	2080	2085	2090	2095	2100	Life Cycle**
Treatment								
High-Level Waste	0	0	0	0	0	0	0	41,627
Transuranic Waste	0	0	0	0	0	0	0	824,378
Low-Level Mixed Waste	0	0	0	0	0	0	0	817,021
Low-Level Waste	0	0	0	0	0	0	0	261,152
Storage and Handling								
High-Level Waste	0	0	0	0	0	0	0	4,482,238
Spent Nuclear Fuel	0	0	0	0	0	0	0	1,663,723
Transuranic Waste	0	0	0	0	0	0	0	527,500
Low-Level Mixed Waste	0	0	0	0	0	0	0	215,069
Low-Level Waste	1	1	1	1	1	1	0	42,091
Disposal								
High-Level Waste	0	0	0	0	0	0	0	461,500
Spent Nuclear Fuel	0	0	0	0	0	0	0	2,886,221
Low-Level Mixed Waste	0	0	0	0	0	0	0	102,512
Low-Level Waste	126	2	0	0	0	0	0	523,667
Hazardous Waste	0	0	0	0	0	0	0	439,722
Sanitary Waste	0	0	0	0	0	0	0	227,906
Other								
Decommissioning	0	0	0	0	0	0	0	1,090,709
Waste Management TSO	0	0	0	0	0	0	0	2,503,041
Inter-Site Disposal Assessment								
Low-Level Mixed Waste	0	0	0	0	0	0	0	-1,155
Low-Level Waste	0	0	0	0	0	0	0	-9,791
Total	127	3	1	1	1	1	0	17,099,130

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Helicopter Fueling Tank to be finished by March 1995. In 1993, six active regulated deferred tanks were replaced. The remaining 15 active non-regulated tanks in the program were combined into one package to be addressed in 1994. Nine were replaced in 1994, two will be finished by spring of 1995, and the remaining will be removed and replaced as the buildings they support are dispositioned in the near future.

In addition to the tank removal and replacement program, a tank tightness program is in place. The tightness program was initiated in 1989, when 16 tanks were tested. Tanks that did not pass were removed. Five tanks were tested in 1993 to ensure compliance; all five tanks passed. Inventory control is performed on a daily basis by the area tank landlord, and tank reconciliation forms are submitted to the Tank Management Program monthly to ensure these checks are being made.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The early deactivation and stabilization of nuclear facilities will allow for a significant reduction in the surveillance and maintenance activities required to maintain the safety envelope at these facilities.

Current Surplus Facilities Stabilization Activities

The Idaho National Engineering Laboratory is currently working to stabilize facilities at the Idaho Chemical Processing Plant. These facilities belonged to Defense Programs operations to reprocess Navy fuel to recover uranium for future use. In April 1992, the decision was made to stop reprocessing Navy fuel, thus transferring the facilities associated with this mission to Environmental Management.

These buildings contain contaminated processes that need to be started up, and a final process run needs to be performed. This includes final uranium collection and solidification to convert the process materials to a stable storage form and achieve accountability measurement and the process systems must be cleaned out to protect the public, the in-plant work force, and environment. The majority of the flush and draining stabilization activities associated with the process in these buildings will be completed by mid FY 1995.

The outstanding activities at the Idaho Chemical Processing Plant are the ROVER and Waste Calcine Facility projects. These are complex projects with many unresolved technical questions and are currently in conceptual design to address the problems and the best approach to resolve them.

Future Contaminated Surplus Facilities

The surplus facility inventory and assessment identified 40 assets at the Idaho National Engineering Laboratory that are not currently owned by Environmental Management but are surplus or will be surplus in the next 5 years. Of the 40 assets, 12 were excluded because they were currently a part of the environmental

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Nuclear Material and Facility Stabilization	42,745	27,006	8,669	265	93	90	4

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Nuclear Material and Facility Stabilization	4,397	27,288	48,787	46,756	25,594	1,060	0	1,206,508

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

restoration activity. The remaining assets were ranked and compiled with the rest of the Department's complex. Three assets were identified to be high ranking (PBF-620, PBF-732, and TRA-660). Nuclear Energy is the current owner of these assets, and they are scheduled to be turned over to Environmental Management in FY 1996.

Noncontaminated Surplus Facilities

Environmental Management currently owns 108 surplus assets at the Idaho National Engineering Laboratory. These surplus assets are noncontami-nated and do not meet the criteria for acceptance into the decommissioning program. These assets were evaluated and ranked with the surplus facility inventory and assessment ranking model. In FY 1994, five assets were demolished, and one asset was identified to be demolished in FY 1995.

LANDLORD FUNCTIONS

The Idaho National Engineering Laboratory landlord program supports identified and prioritized general plant projects and line item construction projects that will correct deficiencies in environmental, utility, fire, and facility-infrastructure systems. Also, general purpose capital equipment will be acquired and managed in support of the Laboratory's missions and goals. Additionally, the landlord program provides an integrated and comprehensive facility planning system that incorporates the Idaho National Engineering Laboratory's strategic long-range and short-range goals.

The Laboratory's infrastructure requirements are dictated by site development plans and the other programs and their specific needs. The infrastructure program provides continuous program management and integrated facility planning as well as coordination and external interface on infrastructure issues. It also supports day-to-day general purpose equipment. It also facility needs such as building and structure maintenance, electrical power, railroad lines, transportation equipment, water supply, steam, roads, fire equipment and training, safeguards and security, telecommunications, computer systems, medical services, laboratory support and sanitary landfill. Priority is given to halting decay or deterioration of the physical infrastructure, providing support services, and continuing a systematic restoration.

PROGRAM MANAGEMENT

Program management and support work encompasses management activities not directly related to specific remediation and decommissioning activities. Program management is necessary to ensure the program is effectively planned, executed, and controlled. Program management establishes the technical, cost, and schedule baseline for the purpose of achieving cost, schedule, and technical goals.

Activities included within program management are technical support and integration, quality and compliance assurance, program planning and reporting, strategic planning, technical support, training, community relations, and data and sample management for the program.

Tasks include maintenance of administrative record files, document control, library services, financial services, planning and scheduling, systems engineering, cost and schedule control, development of multi-access system for data, personnel training, and routine reporting. Quality and compliance assurance provides independent safety, quality, environmental reviews, and oversight of all program work.

Other support includes U.S. Geologic Survey support, Program Management Planning and Integration, Program Management Documentation, Independent Safety Review Committee, and Program Management Training. Roadmapping and Waste Stream tracking are also supported within program management.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Idaho National Engineering Laboratory-Idaho Chemical Processing Plant.

Landlord Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Directly Appropriated Landlord	97,804	93,100	93,100	93,100	93,100	81,780	97,000	

	2035	2040	2045	2050	2055	2060	2065	
Oirectly Appropriated Landlord	86,860	49,920	46,660	35,780	6,325	3,000	3,000	

	2070	2075	2080	2085	2090	2095	2100	Life Cycle**
Oirectly Appropriated Landlord	3,000	3,000	3,000	1,800	0	0	0	4,554,446

* Costs reflact a five-year everage in constant 1995 dollars, except in FY 1995-2000, which is e six-yaar averaga.

** Total Life Cycle is tha sum of annual costs in constant 1995 dollars.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	31,601	42,580	47,552	47,598	48,206	47,029	54,666	

	2035	2040	2045	2050	2055	2060	2065	
Program Management	50,927	34,565	18,678	17,074	330	520	639	

	2070	2075	2080	2085	2090	2095	2100	Life Cycle**
Program Management	561	360	400	240	0	0	0	2,250,131

* Costs raflact a five-yaar avarage in constant 1995 dollars, axcept in FY 1995-2000, which is e six-yaar avaraga.

** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	73,268	74,827	88,233	88,735	88,530	87,084	86,965
Waste Management	215,348	324,107	384,470	335,984	343,274	319,574	408,723
Nuclear Material and Facility Stabilization	42,745	25,694	8,494	89	93	86	0
Directly Appropriated Landlord	97,804	93,100	93,100	93,100	93,100	81,780	97,000
Program Management	31,601	42,580	47,552	47,598	48,206	47,029	54,666
Total	460,765	560,308	621,850	565,507	573,202	535,553	647,354

	2035	2040	2045	2050	2055	2060	2065
Environmental Restoration	86,896	69,517	0	0	628	1,999	2,833
Waste Management	395,666	240,215	212,511	193,277	2,517	483	474
Nuclear Material and Facility Stabilization	4,397	27,288	48,787	45,877	23,655	0	0
Directly Appropriated Landlord	86,860	49,920	46,660	35,780	6,325	3,000	3,000
Program Management	50,927	34,565	18,678	17,074	330	520	639
Total	624,745	421,504	326,636	292,008	33,455	6,003	6,946

	2070	2075	2080	2085	2090	2095	2100	Life Cycle**
Environmental Restoration	2,292	1,516	1,559	935	0	0	0	3,852,348
Waste Management	127	3	1	1	1	1	0	17,099,130
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	1,178,768
Directly Appropriated Landlord	3,000	3,000	3,000	1,800	0	0	0	4,554,446
Program Management	561	360	400	240	0	0	0	2,250,131
Total	5,979	4,879	4,960	2,976	1	1	0	28,962,566

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activities Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration Activities:		Fiscal Yeor
	WAG 1 Test Area North-Assessment	1998
	WAG 2 Test Reactor Area -Assessment	1998
	WAG 3 Idaho Chemicol Processing Plont - Assessment	2003
	WAG 4 Central Facilities Areas-Assessment	2000
	WAG 5 Power Burst Focility and Auxiliory Reactor Areo-Assessment	2000
	WAG 7 Radioactive Waste Management Complex-Miscellaneous-Assessment	2020
	WAG 10 Miscellaneous Areas-Assessment	2002
	WAG 1 Test Area North-Remediation	2006
	WAG 2 Test Reactor Area Remediation	2020
	WAG 3 Idaho Chemical Processing Plant-Remediation	2020
	WAG 4 Central Facilities Areos-Remediation	2003
	WAG 5 Power Burst Focility and Auxiliary Reactor Area-Remediation	2003
	WAG 7 Radioactive Waste Monogement Complex-Miscelloneous-Remediotion	2039
	WAG 7 Rodioactive Waste Management Complex-Pit 9-Remediotion	1999
	WAG 10 Miscellaneous Areas-Remediation	2020
	WAG 1 Test Area North-Decommissioning	2030
	WAG 2 Test Reactor Areo-Decommissioning	2021
	WAG 3 Idaho Chemical Processing Plant-Decommissioning	2066
	WAG 4 Central Facilities Areas-Decommissioning	2071
	WAG 5 Power Burst Focility and Auxiliory Reactor Areo-Decommissioning	2017
	WAG 10 Miscellaneous Areas-Decommissioning	2071
	Idaho Folls Focilities-Decommissioning	2083
Waste Management Activities:		Fiscal Year
	EIS Record of Decision	1995
	Idaho Waste Processing Facility (IPWF)-Construction	2003
	Waste Characterization Storage Facility (WCSF)-Construction	1996

Major Activities Milestones (cont)

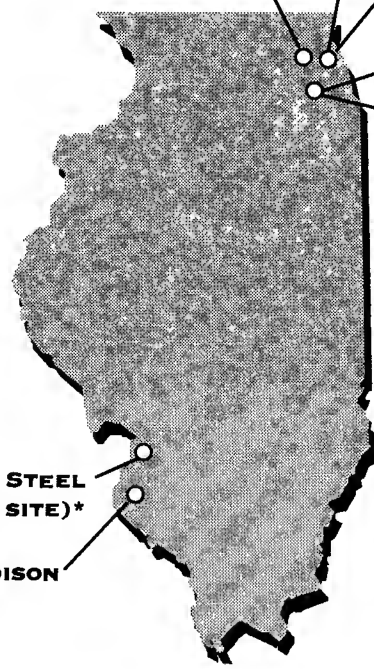
ACTIVITY	TASK	COMPLETION DATE
Waste Management Activities		Fiscal Year
	Law-Level Waste Dispasol Facility (LLW)-Constructian	2000
	Waste Immabilizatian Facility (WIF) Phose I-Canstructian	2001
	Waste Immabilizatian Facility (WIF) Phose II-Constructian	2006
Treatment	Idaho Waste Processing Facility (IWPF)-Operatians	2009
	Waste Immabilizatian Facility (WIF) Phase I-Operations	2008
	Waste Immabilizatian Facility (WIF) Phose II-Operatians	2015
Storage and Handling	Woste Characterization Starage Facility (WCSF)-Operatians	1999
	Spent Nuclear Fuel-remave fuel north $ mid basins CPP-603	1996
	Spent Nuclear Fuel-camplete CP-666 hose I rerack	1997
	Spent Nuclear Fuel-camplete lang-term starage af Three Mile Island-II fuel	2001
	Spent Nuclear Fuel-cansalidate all INEL fuel at Idaha Chemical Processing Plant	2005
	Spent Nuclear Fuel-remave fuel sauth basin CPP-603	2000
Disposal	Law-Level Woste Dispasal Facility (LLW)	2005
	Camplete Hazardaus Waste Operatians	2054
	Camplete High-Level Waste Operatians	2050
	Complete Spent Nuclear Fuel Operotions	2035
	Complete Law-Level Waste Operotions	2094
	Camplete Law-Level Mixed Waste Operatians	2094
	Camplete Transuronic Woste Operatians	2049
	Camplete Sonitary Waste Operatians	2040
Nuclear Materials & Facility Stabilization Activities		Fiscol Yeor
	WAG 1 Test Area Narth-Stobilization	2001
	WAG 2 Test Reactar Area-Stabilizatian	2010
	WAG 3 Idaha Chemicol Processing Plont-Stobilizatian	2049
	WAG 4 Centrol Facilities Areas-Stobilizatian	2054
	WAG 5 Pawer Burst Focility and Auxiliary Reactar Area-Stabilization	2000
	WAG 6 Bailing Water Reactar Experiment Area-Stabilizatian	2010
	WAG 7 Radiaactive Waste Management Camplex-Miscelloneaus-Stobilizotion	2010
	Idaha Falls Facilities-Stabilizatian	2054

Major Activities Milestones (cont)

ACTIVITY	TASK	COMPLETION DATE
Nuclear Materials & Facility Stabilization Activities		Fiscal Year
	WAG 1 Test Area North-Surveillance and Maintenance	2003
	WAG 2 Test Reactor Area-Surveillance and Maintenance	2012
	WAG 3 Idaho Chemical Processing Plant-Surveillance and Maintenance	2051
	WAG 4 Central Facilities Areas-Surveillance and Maintenance	2056
	WAG 5 Power Burst Facility and Auxiliary Reactor Area-Surveillance and Maintenance	2002
	WAG 6 Boiling Water Reactor Experiment Area-Surveillance and Maintenance	2012
	WAG 7 Radioactive Waste Management Complex-Surveillance and Maintenance	2012
	Idaho Falls Facilities-Surveillance and Maintenance	2056
Landlord Activities		Fiscal Year
	Complete Infrastructure Activities at Idaho Chemical Processing Plant	2052
	Complete Infrastructure Activities at Idaho National Engineering Laboratory	2094

For further information on this site, please contact:

Public Participation	*(208) 526-5922*
Public Affairs Office	*(208) 526-0833*
Technical Liaison: Bill Leake	*(208) 526-1713*



*Summaries are not provided for facilities with completed remedial actions.

ILLINOIS

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Argonne National Laboratory-East	25,781	19,060	32,341	33,791	32,298	37,471
Fermi National Accelerator	4,918	2,751	2,862	3,526	3,681	3,779
Site A/Plot M, Palos Forest	1,173	175	2,607	2,832	1,968	1,060
FUSRAP-Illinois	0	0	0	0	0	430
Total	31,872	21,986	37,810	40,149	37,947	42,740

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Argonne National Laboratory-East	28,017	22,842	22,680	17,792	17,578	17,142	14,002
Fermi National Accelerator	3,341	2,320	2,320	2,320	2,320	2,320	1,879
Site A/PlotM, Palos Forest	1,509	196	0	0	0	0	0
FUSRAP-Illinois	72	316	0	0	0	0	0
Total	32,939	25,674	25,000	20,112	19,898	19,462	15,881

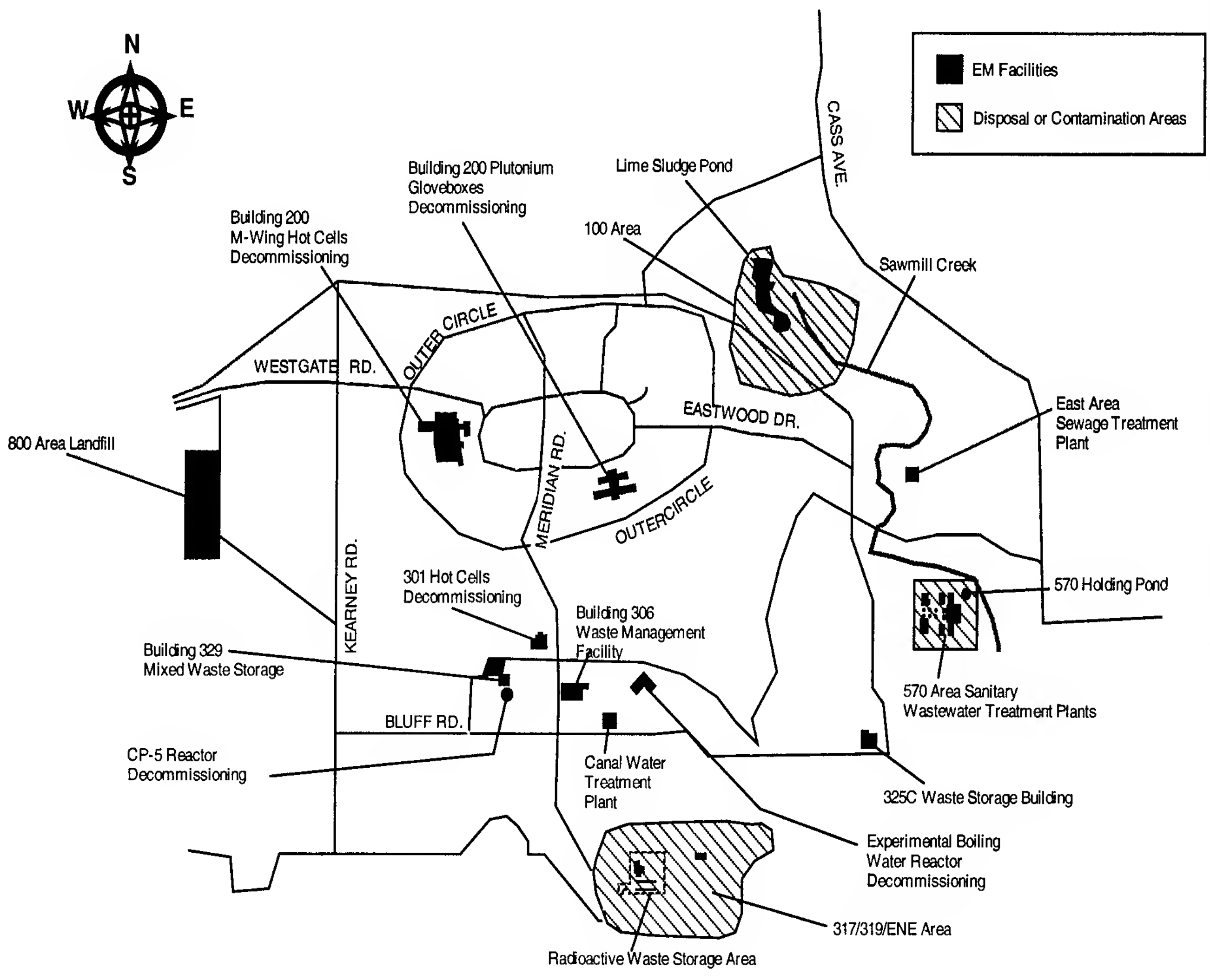
	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Argonne National Laboratory-East	4,048	462	0	0	0	0	0	750,832
Fermi National Accelerator	0	0	0	0	0	0	0	87,427
Site A/PlotM, Palos Forest	0	0	0	0	0	0	0	10,035
FUSRAP-Illinois	0	0	0	0	0	0	0	2,010
Total	4,048	462	0	0	0	0	0	850,304

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

ARGONNE NATIONAL LABORATORY-EAST

Argonne National Laboratory-East is located in Argonne, Illinois. It occupies a 1,700-acre tract in DuPage County, approximately 22 miles southwest of Chicago.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	8,650	5,189	12,890	13,370	14,247	16,683
Waste Management	16,135	13,144	17,902	18,816	16,385	19,062
Program Management	996	727	1,549	1,605	1,666	1,726
Total	25,781	19,060	32,341	33,791	32,298	37,471

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	11,090	5,223	5,385	1,393	99	860	19
Waste Management	15,665	15,829	15,829	16,169	17,235	16,054	13,788
Program Management	1,262	1,789	1,467	230	245	228	196
Total	28,017	22,842	22,680	17,792	17,578	17,142	14,002

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	0	0	0	0	0	0	0	131,440
Waste Management	3,991	456	0	0	0	0	0	590,740
Program Management	57	6	0	0	0	0	0	28,653
Total	4,048	462	0	0	0	0	0	750,832

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

Argonne National Laboratory-East began operations in 1945 in support of the Department of Energy (DOE) and its predecessor agencies.

Argonne National Laboratory-East currently conducts research in a number of areas including advanced-reactor development, superconductivity, improvements in the use of coal for power generation, and electrochemical energy sources. Other projects include the use of superconducting magnets for improved particle accelerators, fundamental studies of the chemistry of coal, the immobilization of radioactive waste for safe disposal, medical-radioisotope technology, genetics research, materials engineering, carcinogenesis, and the biological effects of low levels of radiation. Environmental research includes investigations into the biological activity of energy-related mutagens and carcinogens, and the environmental effects of acid rain.

Argonne National Laboratory-East is expected to continue operating as a multi-program national laboratory dedicated to research and development for the foreseeable future.

ENVIRONMENTAL RESTORATION

The soils and ground water at Argonne National Laboratory-East have been contaminated as a result of accidental spills, past materials management practices, and former waste-disposal practices. The contaminants of concern include volatile and semi-volatile organic compounds, metals, polychlorinated biphenyls (PCBs), and a variety of radionuclides. At present, these contaminants do not pose an immediate threat to the workforce or the general public.

Environmental restoration activities at Argonne National Laboratory-East are not currently subject to interagency agreements or other compliance orders. These activities, including surveillance and monitoring, are expected to conclude by 2030 at the funding levels in the site baseline cost estimate.

To improve efficiency, environmental activities have been organized by project type and/or geographic area. Each section below describes a project unit on this basis.

Treatment Sites

Projects under this grouping are sites where contamination is known or suspected in soils, ground water, and sediments as a result of former point source discharges. The point sources include a wastewater treatment system, coal storage yard, leaking sewer lines, a pond, cooling tower blowdown, and inadvertent air discharges and spills. Contaminants include low concentrations of various radionuclides, polynuclear aromatic hydrocarbons, volatile and semi-volatile organic compounds, PCBs, arsenic, chromium and pesticides. The extent of contamination will not be known until investigations are completed. These projects are scheduled for completion in 2003.

Solid Waste Storage/Disposal

This project consists of the investigation and remediation of contamination which may have resulted from a sanitary landfill, a solid waste landfill, chemical disposal wells (french drains), retired and active underground fuel product storage tanks, a paint solvent disposal area, and a waste oil storage area. Contaminants being investigated in soils and ground water include aromatic hydrocarbons, chlorinated benzenes, heavy metals, laboratory waste, and general rubbish and construction debris. It is assumed contaminants have migrated; however, the extent of migration will not be known until investigations have been completed in 1998. Should remediation be required, it is scheduled for completion in 2005.

Mixed Waste Storage/Disposal

This project concerns characterization and potential remediation of a geographically contiguous area. The sources of contamination included two landfills, two french drains, and a radioactive staging area. Contaminants include volatile and semi-volatile organic compounds, PBCs, lead, and low levels of radionuclides. Preliminary characterization indicates contaminants have migrated into the aquifer and beyond the site boundary. Additional characterization is under way to define the extent of contamination. Remediation is scheduled for completion in 2010.

Remedial Support Activities

The scope of this project supports other remedial activities by focusing efforts on site-wide investigation of hydrogeologic conditions, solid waste management units and inactive waste sites. The intent is to quantify the extent of contamination present in soils, ground water, surface water, and sediments and to identify any additional sources of contamination. All activities are scheduled for completion in 2010.

Facilities Conversion

The Experimental Boiling-Water Reactor is undergoing decommissioning; it will be converted to a facility for storing transuranic waste. The shutdown reactor is contaminated with cobalt-60, iron-55, nickel-63, contaminated and activated lead, and trace quantities of other radionuclides. Most of the contamination is fixed on reactor components, piping, structures, and the like, but some loose contamination is present as well. This project is scheduled for completion in 1995.

Reactor Facililties

The focus of this project group is the decommissioning of six small research reactors, scheduled for completion in 2001. The reactors are the CP-5, Juggernaut, JANUS, ZPR, ATSR, and the Fast-Neutron Generator. Contaminants currently present in the reactors include activation product, residual tritium, cobalt-60, trace amounts of uranium-235 and uranium-238, activated and contaminated lead, beryllium, cadmium, and oxidized fuel. Contamination is confined to reactor areas. No soil or ground-water contamination is expected to be found.

Support Facilities

Decommissioning of research reactor support facilities also is scheduled for completion in 2001. The facilities include plutonium glove boxes, surplus retention tanks for radioactive liquids, an ion exchange facility, and a cyclotron. Contaminants include mixed fission products, plutonium-239, and americium-241. Contamination is confined to equipment and structures in individual facilities, and is not anticipated in environmental media outside the facilities.

WASTE MANAGEMENT

Argonne National Laboratory-East currently manages hazardous, low-level radioactive, low-level mixed, and transuranic waste. It is assumed Argonne National Laboratory-East will continue to operate under the direction of DOE's Office of Energy Research for the foreseeable future. Environmental restoration activities will conclude by 2030 at the assumed funding levels. However, laboratory operations will continue to generate waste. Continuing waste management activities in support of

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	2,937	419	0	0	0	0	0	19,715
Remedial Actions	1,741	3,907	4,268	0	0	0	0	51,322
Surveillance And Maintenance	24	535	1,117	1,393	99	860	19	20,262
Facility Decommissioning	6,388	363	0	0	0	0	0	40,140
Total	11,090	5,223	5,385	1,393	99	860	19	131,440

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

ongoing programs are projected at a cost of approximately $15 million per year. To facilitate the development of this life cycle cost estimate, an arbitrary cutoff date of 2029 has been assigned to all sites that have completed environmental restoration but maintain ongoing waste management support of other DOE programs (Energy Research, Defense Programs, etc.). Waste management support of other Department programs at this site are truncated at 2036; six years after the completion of restoration activities.

Waste management activities at Argonne National Laboratory-East are addressing current National Pollutant Discharge Elimination System permit noncompliances and potential noncompliances, and upgrading Building 306 to conform to all waste-handling regulations and DOE Orders to support safe working conditions and increase the efficiency in waste management operations. Improvements are planned to the electrical, HVAC, and fire protection systems; and to the physical plant to provide for more effective radiological control.

Waste Treatment

Argonne National Laboratory-East currently engages in limited onsite treatment of waste prior to shipment to offsite facilities for disposal. Treatment technologies include neutralization for hazardous waste, neutralization/precipitation for liquid inorganic mixed waste, and a neutralization/precipitation process for liquid transuranic waste. Treatment is expected to continue as waste is generated by ongoing research and development activities. Large-scale treatment facilities are not planned at this time.

Waste Storage

New hazardous, radioactive, and mixed waste storage facilities will be constructed to provide adequate space, effect economical waste shipments, and conform to present and anticipated waste storage regulations. The Low-Level Waste Bin Storage project is planned for the outyears. Argonne National Laboratory-East stores waste in accordance with the provisions of its pending Resource Conservation and Recovery Act Part B Permit.

Waste Disposal

Hazardous waste is sent to commercial facilities for recycling, treatment, or disposal. Low-level radioactive waste is currently sent to DOE's facility in Hanford, Washington, for disposal. Low-level mixed radioactive waste is sent to Hanford for storage pending treatment.

Major Waste Management Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Storage Project	600	0	0	0	0	0	0	3,600

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Argonne National Laboratory-East site.

LANDLORD FUNCTIONS

The DOE's Office of Energy Research is primarily responsible for landlord functions at Argonne National Laboratory-East. The Office of Environmental Management supports these functions by contributing a percentage of overhead, which is calculated annually based on programs funded at the Laboratory.

PROGRAM MANAGEMENT

Program management at Argonne National Laboratory-East is dedicated to program planning and direct management of projects, and to waste minimization activities. Argonne National Laboratory-East does not fund any grants or Agreements-in-Principle at this time.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Argonne National Laboratory-East.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Transuranic Waste	1,815	2,090	2,090	2,090	2,090	2,090	1,734
Low-Level Mixed Waste	854	983	983	1,323	2,389	1,208	1,044
Low-Level Waste	914	1,053	1,053	1,053	1,053	1,053	861
Storage and Handling							
Transuranic Waste	7,059	5,920	5,920	5,920	5,920	5,920	5,522
Hazardous Waste	5,072	5,783	5,783	5,783	5,783	5,783	4,626
Total	15,665	15,829	15,829	16,169	17,235	16,054	13,788

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Transuranic Waste	249	0	0	0	0	0	0	73,066
Low-Level Mixed Waste	409	0	0	0	0	0	0	46,812
Low-Level Waste	73	0	0	0	0	0	0	36,478
Storage and Handling								
Transuranic Waste	3,260	456	0	0	0	0	0	236,545
Hazardous Waste	0	0	0	0	0	0	0	197,839
Total	3,991	456	0	0	0	0	0	590,740

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	1,262	1,789	1,467	230	245	228	196	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Program Management	57	6	0	0	0	0	0	28,653

* Costs reflect e five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle Is the sum of ennual costs in constant 1995 dollars.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Waste Management	313	317	317	323	345	321	276	
Program Management	94	130	104	5	5	5	4	
Total	408	446	420	328	350	326	280	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Waste Management	80	9	0	0	0	0	0	11,813
Program Management	1	0	0	0	0	0	0	1,830
Total	81	9	0	0	0	0	0	13,643

* Costs reflect e five-year everage in constant 1995 dollers, except in FY 1995-2000, which is e six-yeer everege.

** Total Life Cycle is the sum of annuel costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmentol Restorotion	11,090	5,223	5,385	1,393	99	860	19
Woste Monogement	15,352	15,513	15,513	15,846	16,890	15,733	13,512
Progrom Monogement	1,167	1,659	1,363	225	240	223	192
Total	27,609	22,396	22,260	17,464	17,229	16,817	13,722

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmentol Restorotion	0	0	0	0	0	0	0	131,440
Woste Monogement	3,911	447	0	0	0	0	0	578,926
Progrom Monogement	56	6	0	0	0	0	0	26,823
Total	3,966	454	0	0	0	0	0	737,189

* *Costs reflect a fice-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

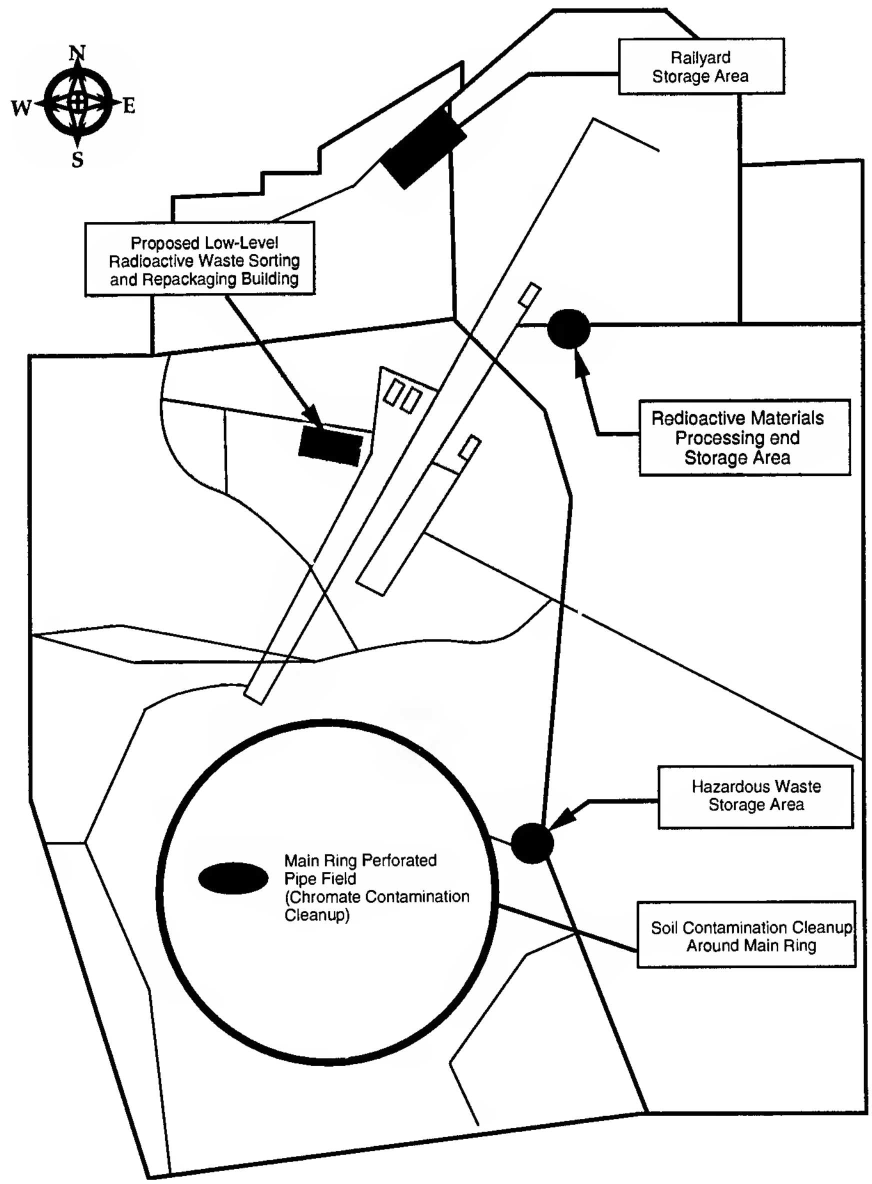
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmentol Restorotion		Fiscol Year
	Facilities Conversion - Project Complete	1995
	Reactor Facilities - Project Complete	2001
	Suppart Facilities - Project Camplete	2001
	Treatment Sites - Praject Camplete	2003
	Salid Waste Storage/Dispasal - Project Camplete	2005
	Remediol Suppart Activities - Project Camplete	2010
	Mixed Waste Starage/Dispasal - Praject Camplete	2010
Waste Management		Fiscal Year
	PCB Sludge Dispasal - Praject Complete	1996
	Waste Starage Praject - Camplete Phose I	1996
	Waste Staroge Praject - Camplete Phase II	1999
	Waste Monogement Operations - Camplete	2036

For further information on this site, please contact : *Public Participation Office* *(708) 252-8796*
Public Affairs Office *(708) 252-2010*
Technical Liaison: Michael Ferrigan *(708) 252-2570*

FERMI NATIONAL ACCELERATOR LABORATORY

The Fermi National Accelerator Laboratory is located in Batavia, Illinois, about 30 miles west of the City of Chicago.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Waste Management	4,918	2,751	2,862	3,526	3,681	3,779

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Waste Management	3,341	2,320	2,320	2,320	2,320	2,320	1,879	87,427

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars*

PAST, PRESENT AND FUTURE MISSIONS

The Fermi National Accelerator Laboratory began its mission as a single-program research and development facility for the Department of Energy (DOE) in 1972 when the first accelerator at the laboratory began operations.

The Fermi National Accelerator Laboratory's mission is to conduct research in high-energy physics. This involves acceleration and collision of subatomic particles and an examination of the products of these interactions. Protons are accelerated using a series of five machines of increasing size and capability. After acceleration, protons may be extracted and sent to one of the three fixed target areas, or they may be kept in the accelerator and used in collisions with antiprotons traveling in the opposite direction. The information gained from these studies contributes to understanding the basic nature of matter and forces.

It is assumed the Fermi National Accelerator Laboratory will continue to operate as a national high energy physics accelerator laboratory under the direction of the Office of Energy Research for the foreseeable future.

ENVIRONMENTAL RESTORATION

There are no current or planned environmental restoration activities at the Fermi National Accelerator Laboratory. All costs and activities associated with the Resource Conservation and Recovery Act (RCRA) corrective action are provided in the following waste management section.

WASTE MANAGEMENT

The Fermi National Accelerator Laboratory has no plans for treatment or disposal facilities onsite. Continuing waste management activities in support of ongoing programs are projected at a cost of approximately $2.3 million per year. To facilitate the development of this life-cycle cost estimate, an arbitrary cutoff date of 2030 has been assigned to all sites that maintain ongoing waste management support of other Department programs (Energy Research, Defense Programs, etc.).

The Fermi National Accelerator Laboratory currently has minor soils contamination related to testing and refilling polychlorinated biphenyl (PCB) containing electric transformers. The Laboratory is currently undertaking a RCRA Facility Investigation for 21 solid waste management units that may represent potential releases to the environment from former operations at the site. Specific sources of contamination, transport mechanisms, degree of contamination, and risk assessment data will not be available until completion of Phase II of the RCRA Facility Investigation in FY 1998.

As a condition of its RCRA Part B permit, the Fermi National Accelerator Laboratory undertook a Phase I investigation. The Phase I report was transmitted to the Illinois Environmental Protection Agency (EPA) on August 31, 1994. Milestones related to potential future work are based on comments and directions from this agency. Should additional work be required as a result of Phase I, Phase II is expected to begin in 1996, following Laboratory preparation, and Illinois EPA approval, of a RCRA Facility Investigation Phase II workplan during FY 1995, and completion of the study in 1998.

Cleanup of PCB contamination in the Fermi National Accelerator Laboratory's Main Ring continues as the Main Ring is shut down each year for routine maintenance. Environmental restoration activities are currently completed under the waste management activities funding.

Waste Treatment

The Fermi National Accelerator Laboratory does not treat hazardous or radioactive waste onsite. All waste is sent offsite for appropriate treatment, as required.

Waste Storage

To facilitate its waste operations, the Fermi National Accelerator Laboratory is currently constructing a new storage facility. This facility is identified in the waste management projects as the Waste Handling Building, the name used in the list of projects required to be addressed by the FY 1994 National Defense Authorization Act to serve as the focal point for all low-level

Major Waste Management Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Handling Building	416	0	0	0	0	0	0	2,500

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.
** Total Life Cycle is the sum of ennual costs in constant 1995 dollars.
Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

radioactive, nonhazardous waste activities. This facility will replace currently outdated facilities and is expected to be complete in 1996. All waste is collected, handled, and stored in accordance with the provisions of the Fermi National Accelerator Laboratory's RCRA Part B Permit.

Waste Disposal

Radioactive waste is shipped to DOE's Hanford, Washington facility for disposal. Commercial facilities and brokers are used for hazardous waste.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Fermi National Accelerator Laboratory.

LANDLORD FUNCTIONS

At the present time, landlord activities at the Fermi National Accelerator Laboratory are primarily the responsibility of DOE's Office of Energy Research. The Environmental Management program at the Laboratory supports landlord activities through a percentage of overhead calculated on an annual basis, based on programs funded at the Laboratory. There are no plans for the Environmental Management program to assume landlord functions at the site.

PROGRAM MANAGEMENT

Program management at the Fermi National Accelerator Laboratory involves program planning, management of small projects, waste minimization activities, and ongoing waste management activities. Program management activities are not separated from routine operations. The Laboratory does not fund any grants or Agreements-in-Principle at this time.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-Level Waste	1,634	1,135	1,135	1,135	1,135	1,135	931	42,829
Hazardous Waste	1,706	1,185	1,185	1,185	1,185	1,185	948	44,598
Total	3,341	2,320	2,320	2,320	2,320	2,320	1,879	87,427

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Fermi National Accelerator Laboratory.

Nondefense Funding Estimate

	Five-Year Averages (Thousands of Constant 1995 Dollars)**							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Management	3,341	2,320	2,320	2,320	2,320	2,320	1,879	87,427

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

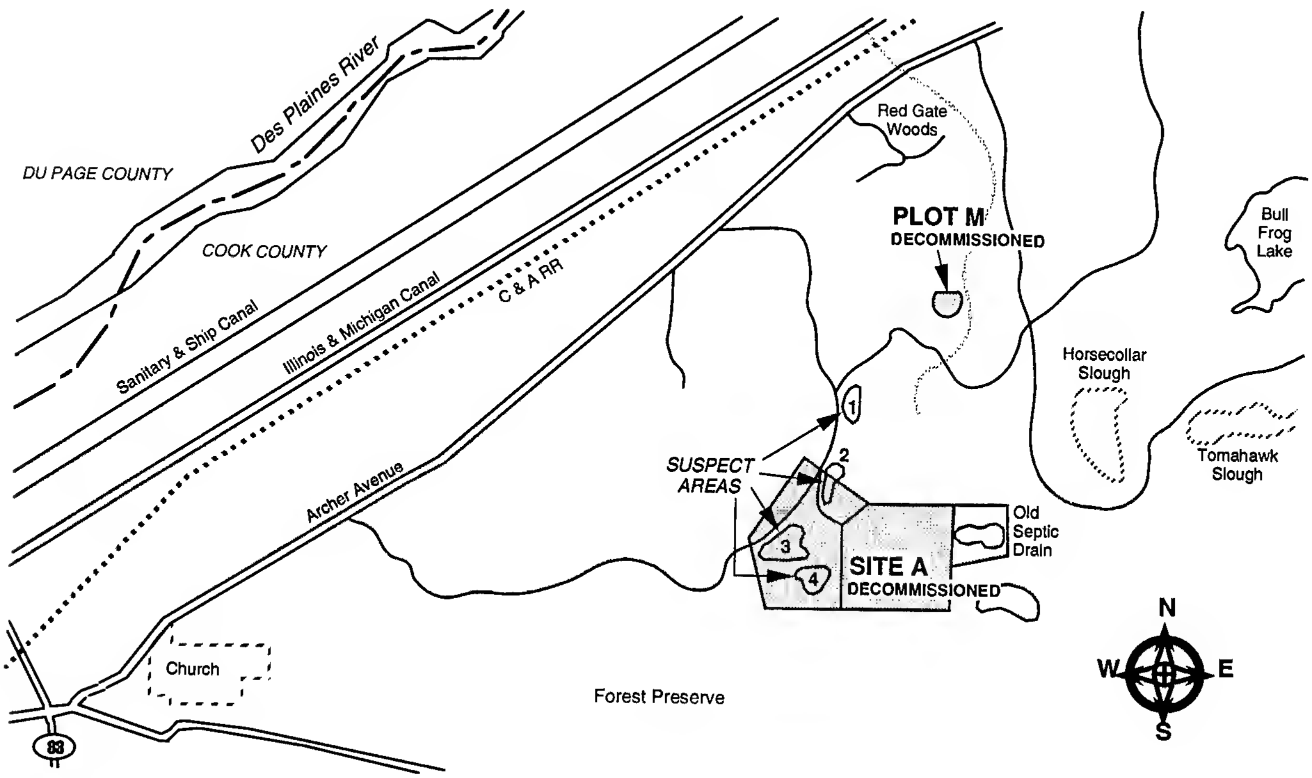
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
		Fiscal Year
Waste Management		
	Waste Handling Facility - Complete Construction	1996
	Complete RCRA Facility Investigation	1998

For further information on this site, please contact: *Public Participation Office* *(708) 252-8796*
Public Affairs Office *(708) 252-2010*
Technical Liaison: Michael Ferrigan *(708) 252-2570*

SITE A/PLOT M, PALOS FOREST PRESERVE

Site A/Plot M is located in the Palos Forest Preserve in Cook County, Illinois.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	1173	175	2607	2832	1968	1060

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	1,509	196	0	0	0	0	0	10,035

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

Site A/Plot M was the site of early activities undertaken by the Manhattan Engineer District (a predecessor of the Department of Energy) between 1943 and 1956. Site A contained two experimental nuclear reactors and associated laboratories. Plot M was used for the burial of radioactive waste from experiments at Site A. Initial work involved research and development for nuclear fuels for use in defense activities.

Environmental restoration, surveillance, and maintenance activities at Site A are expected to continue as long as the entombed bioshield remains in place. There are no plans to remove the bioshield at this time.

Site A/Plot M has no current mission and it is assumed Site A/Plot M will eventually be returned to the Cook County Forest Preserve District for unrestricted use (the current owner) as part of the Palos Forest Preserve.

ENVIRONMENTAL RESTORATION

Environmental media of concern include soils and ground water. Contaminants may include various radioisotopes, and volatile organic compounds, semi-volatile organic compounds, and heavy metals. Transport mechanisms, degree of contamination, and potential threats to workers and the general public are currently being investigated. Data concerning these areas will be available in FY 1996.

Current environmental restoration activities include continued surveillance and monitoring of ground water and surface streams for a variety of hazardous compounds and radioisotopes. In addition, a comprehensive investigation of potential contamination at Site A is currently being conducted, with the final report expected in FY 1995. Pending analyses of data from the investigation and discussion with the current site owner and local regulators, remedial activities may be conducted at the site.

Costs and scope of possible remedial activities have not been included in the total life cycle cost estimate for this project. Assuming remedial activities are deemed unnecessary, this project is expected to conclude in 1996, with long-term surveillance and maintenance continuing indefinitely. If remedial activities are required, the project is expected to be completed by 2005.

WASTE MANAGEMENT ACTIVITIES

All waste generated as a result of investigations and remediation at Site A/Plot M will be treated and disposed of at appropriate offsite locations. There are no plans to construct treatment, long-term storage, or disposal facilities at Site A/Plot M. Management of waste will be funded within the scope of environmental restoration activities.

Waste Treatment

No treatment activities are carried out or are planned for Site A/Plot M. Waste is sent offsite for treatment, if required.

Waste Storage

Investigation-derived waste is collected, packaged, and classified for shipment to offsite facilities.

Waste Disposal

Wastes are shipped to appropriate offsite facilities for disposal.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material or facility stabilization activities at Site A/Plot M.

LANDLORD FUNCTIONS

At the present time, landlord activities at Site A/Plot M are the responsibility of the current owner; the Cook County Forest Preserve District.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Long Term Surveillance And Monitoring	1,509	196	0	0	0	0	0	10,035

* Costs reflect a five-year average in constant 1995 dollars, except in FY 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PROGRAM MANAGEMENT

Program management at Site A/Plot M is concerned with surveillance and maintenance, investigation, and review and analysis of data. These activities are performed by operations office personnel on a level-of-effort basis.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for A/Plot M, Palos Forest Preserve.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	755	98	0	0	0	0	0	5,018

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	755	98	0	0	0	0	0	5,018

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration and Associated Waste Management		Fiscal Year
	Site A Characterization - Complete Characterization Activities	1995
	Determination if Remedial Action is Warranted	1996
	Site A Surveillance and Maintenance - Complete Remedial Action, if Warranted	2005

For further information on this site, please contact: *Public Participation Office* (708) 252-8796
Public Affairs Office (708) 252-2010
Technical Liaison: Michael Ferrigan (708) 252-2570

ILLINOIS FUSRAP SITES

Madison is the only active Illinois facility within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and Atomic Energy Commission sites to reevaluate their radiological condition and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States and is funded through the Oak Ridge Operations Office.

The model used to estimate costs for this report provides one cost for all of the FUSRAP sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs, see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Illinois-FUSRAP	0	0	0	0	0	430

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Illinois-FUSRAP	72	316	0	0	0	0	0	2,010

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

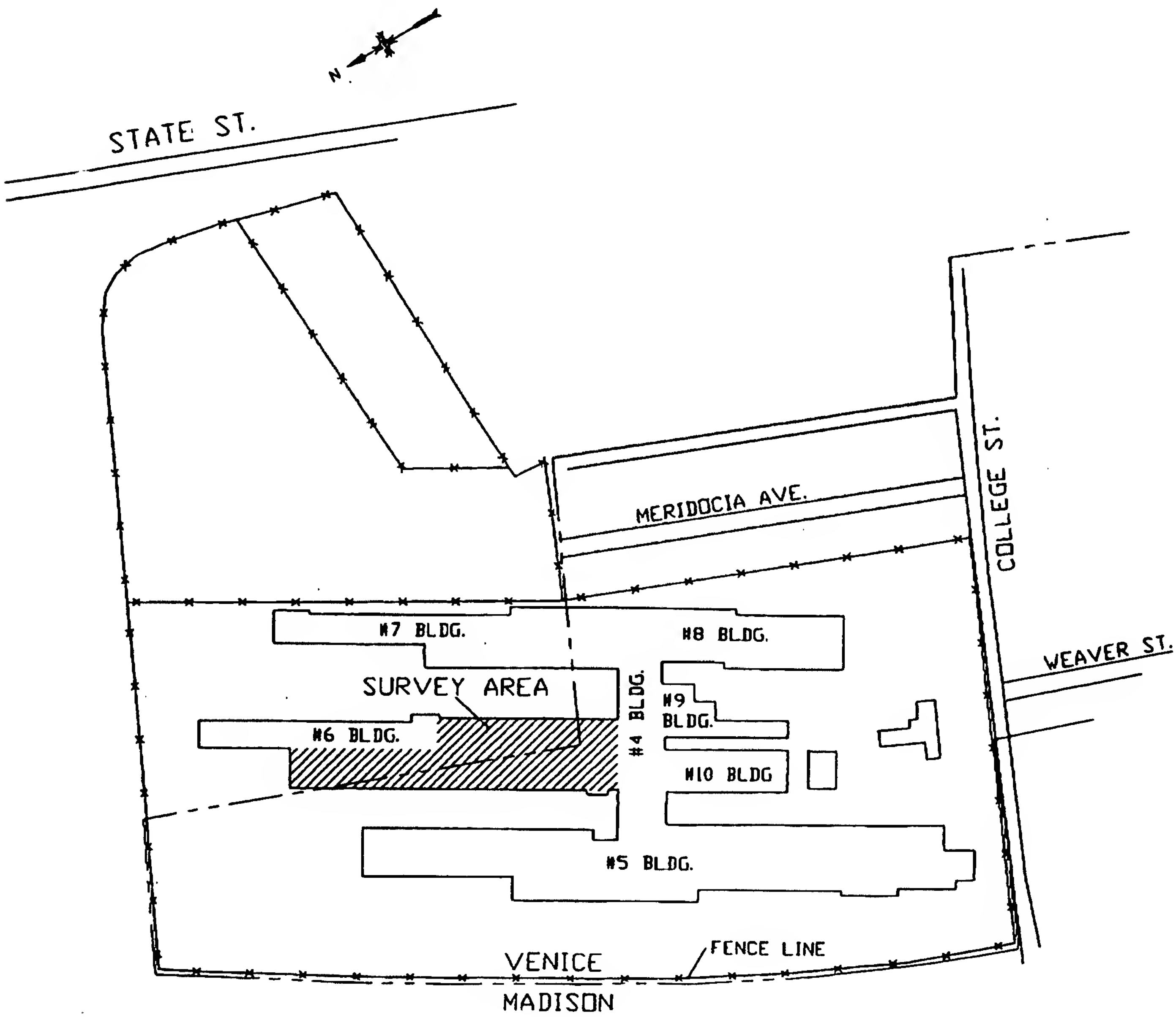
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	72	316	0	0	0	0	0	2,010

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

MADISON
(Formerly Utilized Sites Remedial Action Program)

This former Dow Chemical Company plant is located at College and Weaver Streets in Madison, Illinois, across the Mississippi River from St. Louis, Missouri.



PAST, PRESENT, AND FUTURE MISSIONS

Madison, covering a total of 735 acres, extruded uranium for the Atomic Energy Commission from 1957 to 1960. The plant consists of a large, multi-sectional complex of 10 interconnecting buildings with a total area under roof of approximately 1.4 million square feet.

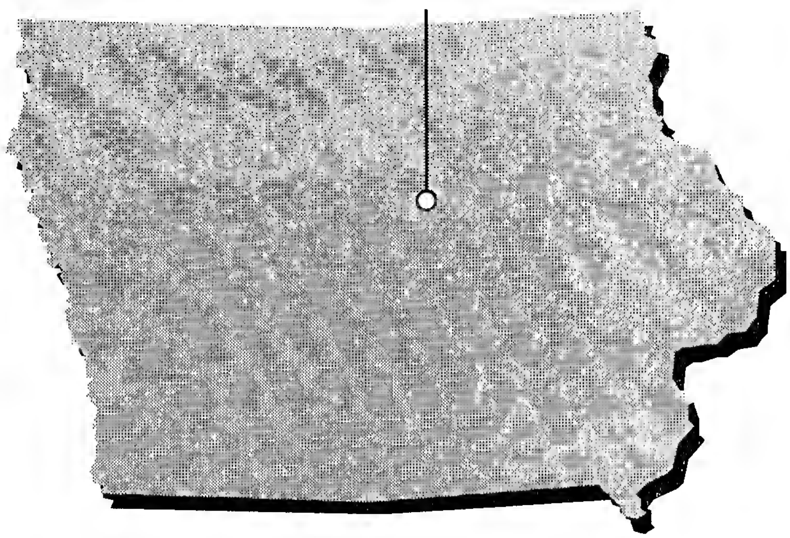
The facility was used for uranium extrusion and rod-straightening work. These activities were performed in Building 6, a large multistory metal building with a concrete floor. The site is currently used for extruding aluminum and magnesium metal and for storing equipment and parts. This site will be released for unrestricted use following completion of cleanup.

ENVIRONMENTAL RESTORATION

The waste volume is estimated to be 10 cubic yards. The waste is uranium contaminated and classified as low-level radioactive waste. The only identified contamination is uranium in the dust on roof support beams.

No remedial action has been conducted to date.

For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*



IOWA

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Ames	1,670	783	785	818	826	851

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

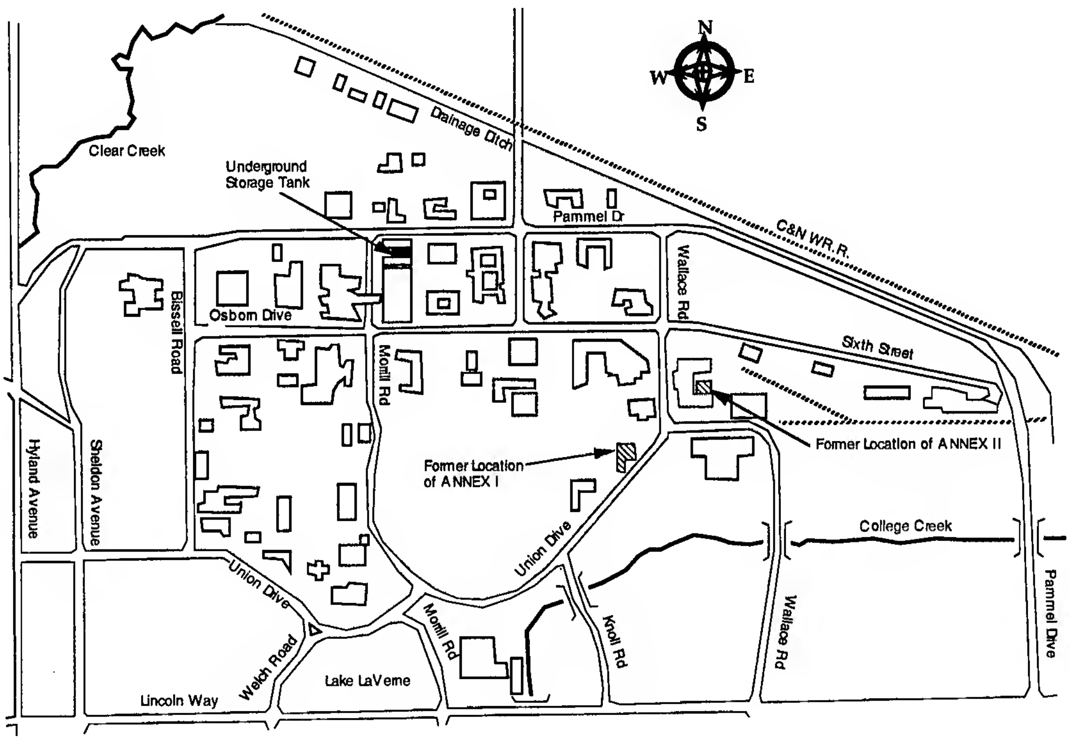
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Ames	898	554	486	309	306	285	195	16,059

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

AMES LABORATORY

Ames Laboratory is located on the campus of Iowa State University in Ames, Iowa. The Ames Laboratory is managed by the Department of Energy (DOE) Chicago Operations Office.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	1,150	221	275	270	264	259
Waste Management	300	308	307	332	339	356
Program Management	220	254	203	216	223	236
Total	1,670	783	785	818	826	851

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	388	113	72	0	0	0	0	3,255
Waste Management	300	239	239	240	237	221	151	8,442
Program Management	210	201	175	69	69	64	44	4,362
Total	898	554	486	309	306	285	195	16,059

** Costs reflect a five-yeer average in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year average.

*** Total Life Cycle is the sum of ennual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Ames Laboratory began operations in 1942 under the Manhattan Engineer District (a predecessor of DOE) during World War II to conduct research and development in support of the war effort. Ames Laboratory conducts basic and intermediate-range applied research in physical, mathematical, and engineering sciences that underlie energy technologies and other areas of national importance. In addition, Ames Laboratory uses its unique strengths in materials preparation and processing, chemical sciences, and materials reliability to solve complex materials problems in energy production and utilization.

It is assumed Ames Laboratory will continue to operate under the direction of DOE's Office of Energy Research for the foreseeable future. Environmental restoration activities are scheduled to end in 2010 at assumed funding levels. However, laboratory operations will continue to generate waste. Continuing waste management activities in support of ongoing programs are projected at a cost of approximately $240,000 per year. To facilitate the development of this life-cycle cost estimate, an arbitrary cutoff date of 2030 has been assigned to all sites that have completed environmental restoration but maintain ongoing waste management support of other Department programs (Energy Research, Defense Programs, etc.).

ENVIRONMENTAL RESTORATION

The principal environmental media of concern at Ames Laboratory are soils and ground water. The principal contaminants of concern are diesel fuel, uranium, thorium, tritium, mercury, thallium, potassium, lithium, and kerosene. Contamination is a result of accidental spills and past materials and waste management practices such as use of an 80,000-square-foot waste burial site (known as the Chemical Disposal Site) near the Iowa State University Applied Sciences complex from 1958 through 1966.

The primary current restoration activity is investigation and remediation of the Ames Chemical Disposal Site. There are no enforceable agreements governing this task; however, Comprehensive Environmental Response, Compensation, and Liability Act regulations are being followed to complete this non-time critical removal action.

Characterization and removal activities began in 1990, and are expected to be complete in FY 1995. Preliminary data indicate ground water onsite exceeds maximum contaminant levels for radionuclides; additional characterization is underway to assess potential offsite contamination, and is expected to be complete in 1997. At this time, ground-water monitoring is expected to be conducted for four quarters. At the end of that time, the need for additional monitoring and/or remediation will be negotiated with the regulators.

A second restoration activity currently underway is monitoring a diesel fuel spill which occurred more than 20 years ago. The faulty tank was removed at that time, however, contaminated soils were left in place. The area of contamination is currently beneath a building, and cannot be removed without structural damage to the building. Ames Laboratory expects to continue to monitor the area of contamination regularly to ensure ground water does not become contaminated.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	257	0	0	0	0	0	0	1,540
Surveillance And Maintenance	131	113	72	0	0	0	0	1,715
Total	388	113	72	0	0	0	0	3,255

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is e six-yeer everage.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

WASTE MANAGEMENT

No large-scale treatment, storage, or disposal facilities are planned for the Ames Laboratory. Ames Laboratory manages hazardous, low-level radioactive, and very small amounts of low-level mixed waste (less than .04 cubic meters are expected in 1996). Ames expects to continue to ship its hazardous and low-level radioactive waste to offsite facilities for treatment and/or disposal, as appropriate. Low-level mixed waste will be brokered for inclusion in larger shipments for treatment and/or disposal, as appropriate.

Waste Treatment

Ames does not treat waste onsite; all waste is shipped offsite for treatment, as required.

Waste Storage

All waste is collected in satellite accumulation areas and then brought to a central staging area for packaging and certification for shipment and disposal.

Waste Disposal

Hazardous waste is brokered and disposed by appropriate commercial firms; low-level waste is shipped to DOE's Hanford, Washington, facility.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at Ames Laboratory.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-Level Waste	67	54	54	54	52	36	3	1,660
Storage and Handling								
Low-Level Waste	0	0	0	0	0	0	0	7
Hazardous Waste	233	185	185	185	185	185	148	6,774
Total	300	239	239	240	237	221	151	8,442

** Costs reflect a five-yaar averaga in constant 1995 dollars, axcapt in FY 1995-2000, which is a six-year everaga.*

*** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

LANDLORD FUNCTIONS

At the present time, landlord activities at Ames Laboratory are primarily the responsibility of DOE's Office of Energy Research. The Environmental Management program at Ames Laboratory supports landlord activities through a percentage of overhead calculated on an annual basis, based on programs funded at the Laboratory. There are no plans for the Environmental Management program to assume landlord functions at the site.

PROGRAM MANAGEMENT

Program management at Ames Laboratory consists of program planning and direct management of projects, and waste minimization activities. Ames Laboratory does not fund any grants or Agreements-In-Principle at this time.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Ames Laboratory.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	210	201	175	69	69	64	44	4,362

* Costs reflect a five-year everage in constent 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annuel costs in constant 1995 dollars.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	388	113	72	0	0	0	0	3,255
Program Management	138	132	106	0	0	0	0	2,017
Total	526	245	178	0	0	0	0	5,272

* Costs reflect a five-year everege in constent 1995 dollers, except in FY 1995-2000, which is a six-year everege.

** Total Life Cycle is the sum of annuel costs in constant 1995 dollars.

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Management	300	239	239	240	237	221	151	8,442
Program Management	71	69	69	69	69	64	44	2,345
Total	371	308	309	309	306	285	195	10,787

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Chemical Disposal Site - Submit Final Remedial Action Plan	1995
	Underground Storage Tank Removal - Submit Completion Report	1999
	Chemical Disposal Site - Submit Final Completion Report	2010
	Complete Environmental Restoration Activities	2010
Waste Management	Ongoing Non-EM Program Costs Truncated	2030

For further information on this site, please contact:

Public Participation Office (708) 252-8796
Public Affairs Office (708) 252-2010
Technical Liaison: Michael Ferrigan (708) 252-2570

KENTUCKY

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Maxey Flats	2,200	8,000	8,000	8,000	1,200	1,200
Paducah Gaseous Diffusion Plant	59,000	58,600	61,000	62,300	56,000	64,100
Total - Kentucky	61,200	66,600	69,000	70,300	57,200	65,300

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025
Maxey Flats	4,767	0	0	0	0	0
Paducah Gaseous Diffusion Plant	55,202	80,307	102,488	81,541	155,313	154,732
Total - Kentucky	59,969	80,307	102,488	81,541	155,313	154,732

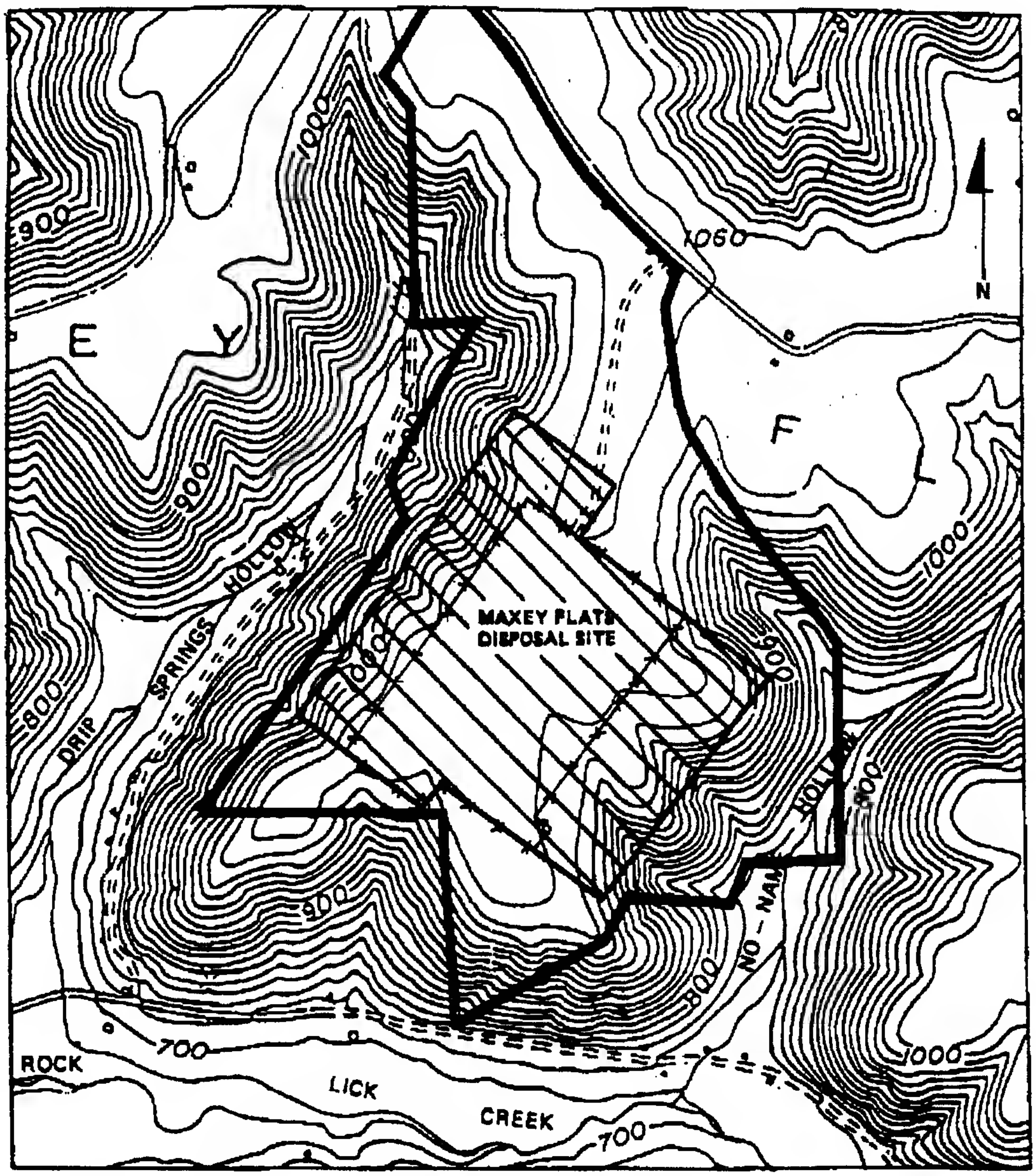
	FY 2030	2035	2040	2045	2050	2055	Life Cycle***
Maxey Flats	0	0	0	0	0	0	28,600
Paducah Gaseous Diffusion Plant	129,828	127,916	84,873	74,631	10,483	378	5,342,353
Total - Kentucky	129,828	127,916	84,873	74,631	10,483	378	5,370,953

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

MAXEY FLATS

The Maxey Flats low-level waste disposal site is located about 9 miles northwest of Morehead, Kentucky; 65 miles northeast of Lexington, Kentucky; and 200 miles southeast of Cincinnati, Ohio. The 280-acre site is owned by the Commonwealth of Kentucky.



Estimated Site Total

	(Thousands of Current 1995 Dollars)*					
	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	2,200	8,000	8,000	8,000	1,200	1,200

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

	Five-Year Averages (Thousands of Constant 1995 Dollars)**							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	4,767	0	0	0	0	0	0	28,600

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Maxey Flats was opened under a lease arrangement between the State of Kentucky and the Nuclear Engineering Company (now U.S. Ecology, Inc.) of Louisville, Kentucky, in January 1963. The site contains long-lived radionuclides brought to the site from research laboratories, electric utilities, Government and private health-care facilities, manufacturing companies, and nuclear powerplants throughout the United States. The hazardous refuse was buried in 51 trenches measuring up to 650 feet long, 70 feet wide, and 30 feet deep. A total of 4.75 million cubic feet of radioactive waste is estimated to have been buried at the Maxey Flats site. U.S. Ecology, Inc. operated Maxey Flats until commercial operations were terminated in 1977.

ENVIRONMENTAL RESTORATION

In 1986, the Environmental Protection Agency (EPA) notified 832 Potentially Responsible Parties, including the Department of Energy (DOE), that Maxey Flats had been placed on the Superfund National Priorities List. These parties include other Federal agencies, Federal contractors, medical facilities, physicians, clinics, industry, State agencies, transporters, broker/haulers, and the land owner. A Remedial Investigation/Feasibility Study was completed in 1991, and the Record of Decision was issued by the EPA on September 30, 1991. Westinghouse Electric Corporation is currently under contract to the State of Kentucky to manage the site.

As a designated Potentially Responsible Party, DOE is responsible for funding a portion of the cleanup. It is assumed, for purposes of this report, that the remediation of Maxey Flats will be completed by the State of Kentucky by FY 2000. The Department's estimated annual monetary contribution toward the remediation, proportional to the level of effort required by the State of Kentucky, is provided in the Estimated Site Total table.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	4,767	0	0	0	0	0	0	28,600

*Costs reflect e five-yeer average in constant 1995 dollers, except in FY 1995-2000, which is e six-yeer everege.

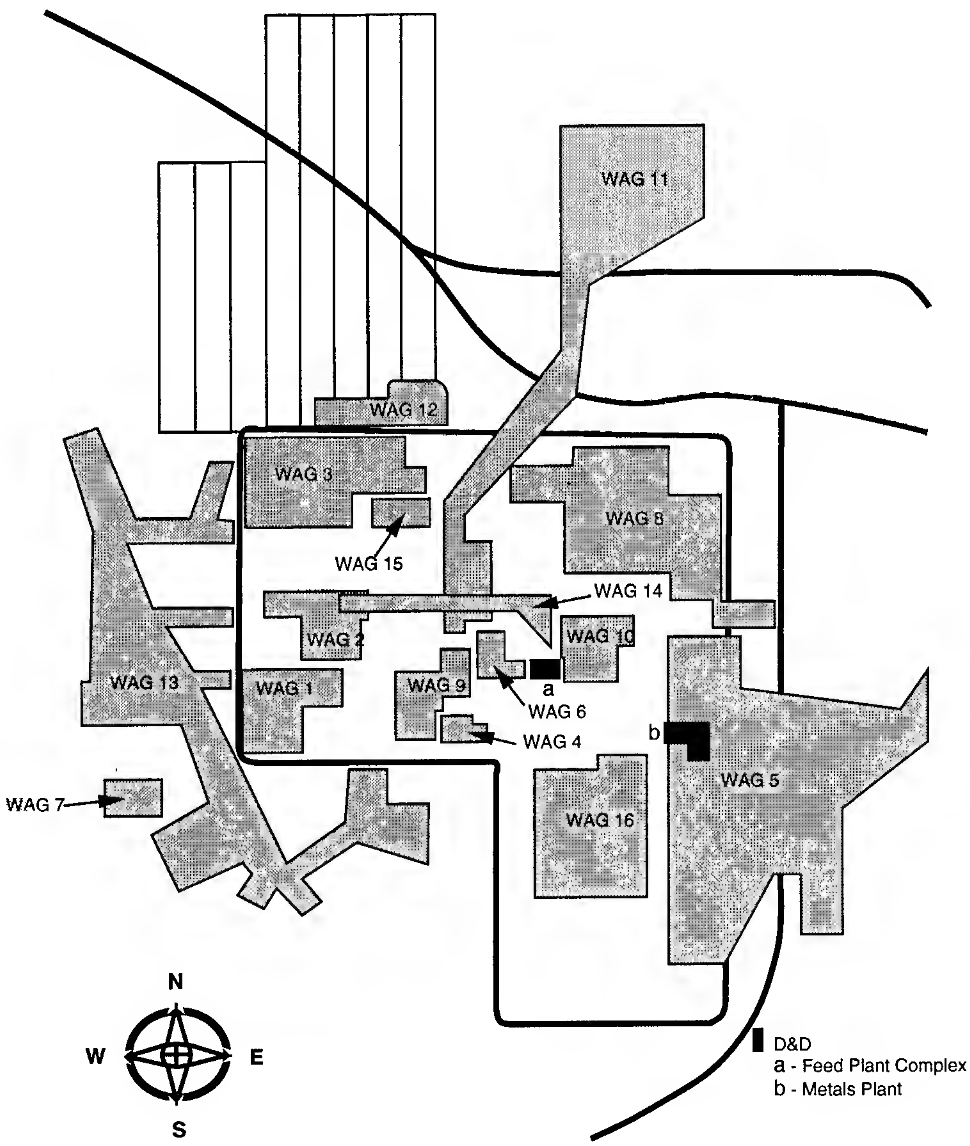
**Total Life Cycle is the sum of annual costs in constent 1995 dollers.

For further information on this site, please contact:

For further information on this site, please contact:	*Public Participation Office*	*(202) 586-7633*
	Public Affairs Office	*(202) 586-5820*
	Technical Liaison: William Wisenbaker	*(301) 427-1619*

PADUCAH GASEOUS DIFFUSION PLANT

The Paducah Gaseous Diffusion Plant is located 10 miles west of Paducah, Kentucky. The site encompasses 750 acres inside a 3,422-acre tract of property owned by the Department of Energy (DOE).



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	53,600	50,400	51,700	51,200	46,000	55,600
Program Management	5,400	8,200	9,300	11,100	10,000	8,500
Total	59,000	58,600	61,000	62,300	56,000	64,100

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area essume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Environmental Restoration	47,118	71,186	93,234	78,556	149,148	132,810	114,677	
Program Management	8,084	8,851	9,265	2,985	6,165	21,922	15,151	
Total	55,202	80,037	102,498	81,541	155,313	154,732	129,828	
	FY 2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle*****
Environmental Restoration	111,275	72,554	61,845	2,812	378	0	0	4,725,084
Program Management	16,640	12,319	12,785	7,671	0	0	0	617,270
Total	127,916	84,873	74,631	10,483	378	0	0	5,342,353

** *Costs reflect e five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The past and present mission of the Paducah Gaseous Diffusion Plant has primarily focused on the separation of uranium isotopes by gaseous diffusion. The process produces enriched uranium used as fuel in commercial powerplants. Although the plant is leased and operated by the U.S. Enrichment Corporation, environmental restoration and related waste management activities are conducted by DOE as the agency with property responsibility.

The mission of the Paducah Gaseous Diffusion Plant will continue until the separation of uranium isotopes is no longer needed by the U.S. Enrichment Corporation or the Federal Government. The ultimate use of the site is yet to be decided. However, since long-term surveillance, maintenance, and institutional controls will continue indefinitely, limiting future uses, it is assumed the site will be used by the Federal Government for some type of industrial activity.

ENVIRONMENTAL RESTORATION

The remedial action sites are not being cleaned up for unrestricted use, therefore institutional controls will be required. Interim corrective measures, such as hydraulic containment of contaminated ground water, have been required by the Environmental Protection Agency (EPA) and the Commonwealth of Kentucky.

The operation of the Paducah Gaseous Diffusion Plant has produced a number of contaminated areas, both at the site and beyond its boundaries. Ground water northwest of the site has been found to be contaminated with the radionuclide technetium-99. Technetium-99 was introduced at Paducah by the Reactor Fuels Program, which involved the reprocessing of spent nuclear fuel.

The chlorinated solvent trichloroethylene, formerly used for cleaning metal and machinery parts, has been identified in ground-water plumes both to the northwest and northeast of the site. Polychlorinated biphenyl (PCB) contamination is present at the site and in offsite drainage ditches. PCBs were used in electrical equipment, in hydraulic systems, and as a fire retardant.

The Paducah Plant areas under investigation have been divided into 24 waste area groups, and there are 200 potential release sites (solid waste management units) from which contaminants could migrate. Not all of the 24 waste area groups are discussed herein because many will require no further remedial action or are not yet a part of the environmental restoration activities. Also, some waste area groups have been combined in the following text because the same remedial actions will be applied. In all cases, the excavated soil will be landfilled, if clean, or sent to offsite treatment and disposal facilities if contaminated.

Waste Area Groups 1 and 7

Waste Area Group 1 includes one active sewage treatment plant, one active training area, and one trichloroethylene spill site. Waste Area

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	45,108	69,386	78,117	43,419	49,433	12,653	6,545
GDP Decomissioning	2,010	1,799	15,117	35,137	99,716	120,157	108,132
Total	47,118	71,186	93,234	78,556	149,148	132,810	114,677

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	4,496	1,564	624	2,812	378	0	0	1,617,788
GDP Decomissioning	106,779	70,990	61,221	0	0	0	0	3,107,296
Total	111,275	72,554	61,845	2,812	378	0	0	4,725,084

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Group 7 is comprised of five underground storage tanks at an active water treatment plant, an inactive sanitary sewage treatment plant, one toluene spill site, and a burn area. The remedial actions for these waste area groups include removal of the tanks, excavation of contaminated soils, backfilling the excavations, and capping the soil. Leachate from the area will be collected and monitored. Remediation will be completed in FY 2015.

Waste Area Groups 6, 17 and 18

Waste Area Group 6 includes tanks, a sump, a PCB spill site, and a trichloroethylene release site near Building C-400 This group also includes an area west of the boundary fence formerly used for testing the integrity of uranium hexafluoride storage cylinders. Suspected contaminants include PCBs, trichloroethylene, and technetium-99.

Waste Area Group 17 consists of 37 scattered potential release sites. The suspected contaminants are radionuclides.

The plant storm sewer system (Waste Area Group 18) is a network of buried piping used to collect surface, building roof, and floor drainage. The drainage is discharged through effluent ditches to the north-south diversion ditch and Big Bayou and Little Bayou Creeks. Suspected contaminants include PCBs and radionuclides. The PCBs, trichloroethylene, and radionuclides may have been discharged to the sewer system in the past. Floor drains in most buildings are now plugged to prevent inadvertent discharges to the sewer systems from spills.

No remedial actions have been identified for these waste area groups, as yet. Characterization is expected to be completed in FY 2010.

Waste Area Group 8

This group is located inside the northeast corner of the security fence and consists of four potential release sites including a uranium hexafluoride vaporization facility (C-337-A), two switchyards (C-535 and C-537), and a pump house and cooling tower (C-637). Also in this group is an active diked storage area for waste PCBs and an effluent ditch. Environmental restoration, which will include soil excavation and backfilling, is estimated to be completed in FY 2025.

Waste Area Group 9

Waste Area Group 9, located near the center of the plant, consists of nine potential release sites, four of which are known to be contaminated. The first confirmed release site involves soil contaminated by a diesel oil spill that occurred on the east side of the C-600 storage tanks. The second confirmed release site involves soil contamination around a pipeline and vaults at the Chromate Reduction Facility. Contaminants include PCBs, uranium, and technetium-99. The third site involves a storm sewer sump building that received wastewaters from a building used for the assembly of electrical components. The fourth site, the acetylene-building drain pits (C-729), received waste from an acetylene generation process.

The other sites, for which contaminants have not yet been identified, are an underground oil-storage tank (C-750-D), an acid-neutralization tank (C-722), a waste-oil tank (C-601), and a motor-cleaning shop (C-728). The diesel oil tanks, the acid-neutralization tank, other underground storage vessels, a portion of the pipeline, the sump, and the drains will be excavated and removed or grouted in place. The surrounding soil will also be excavated and removed. The remedial actions are to be completed in FY 2025.

Waste Area Groups 10 and 16

Waste Area Group 10 includes one holding pond, one aboveground storage tank, and one cooling tower. Contaminants of concern include PCBs and sulfuric acid.

Waste Area Group 16 contains two areas contaminated with PCBs and one aboveground tank. This group is contaminated with uranium, pentachlorophenol, and petroleum hydrocarbons. Remediation for both of these groups will require the excavation and removal of contaminated soil.

Waste Area Groups 12 and 15

Waste Area Group 12 is associated with the chromate reduction facility, which was used to treat chromated cooling water before discharge. The chromate added to the cooling water served as a corrosion inhibitor in systems in which it was used. The chromate was later replaced by a phosphate-based corrosion inhibitor. The facility's sludge lagoon and the full-flow lagoon contain chromium, PCBs, and uranium. In-place vapor extraction will be used in the lagoons to remove the contaminants. The lagoons will then be stabilized, backfilled, and covered with a multilayered cap. The chromate reduction facility will be demolished and removed, and its site will be restored. These actions are scheduled for completion in FY 2045.

Waste Area Group 15 is located in the northern portion of the plant. It consists of a warehouse, a former storage area for PCB transformers, two 4,000-gallon underground diesel tanks, and an acid-neutralization lagoon. The site of the transformer-storage area will be excavated and backfilled. The underground tanks will be removed, and the sites will be excavated and backfilled. The completion of remediation is scheduled for FY 2025.

Waste Area Group 13

Waste Area Group 13 includes four lagoons associated with the influent water treatment plant and an earthen berm in the southwest portion of the plant. The sediments in the lagoons and the soils within and adjacent to the berm may be contaminated with PCBs and mercury. In- place vapor extraction will be used to treat the lagoons, which will then be stabilized, backfilled, and covered with a multilayered cap. The soils at the earthen berm will be washed and removed, and the berm will be backfilled. These actions will be completed in FY 2009.

Underground Storage Tanks

The potential release sites at the Paducah site include five underground storage tanks other than those assigned to the waste area groups discussed above. All of these tanks are within the boundaries of the plant. Three of the tanks have been removed. The other two will be left in place and monitored.

Offsite Ground Water

Contamination with trichloroethylene, technetium-99, and other substances may be present at ground-water wells north of the Paducah Gaseous Diffusion Plant. The source and extent of the contamination will be determined in investigations scheduled to end in FY 2009. At the northwest contamination plume, an interim remedial action will be implemented, including the construction of wells to be used to pump out and treat the ground water. Other actions include extension of the municipal waterline and completion of construction and beginning of operation of corrective actions for the trichloroethylene and technetium-99 ground-water contamination and sources. Interim actions also are planned for the northeast plume as well as containment

actions for the sources of both plumes. Remediation will be completed in FY 2020. Long-term monitoring will continue indefinitely.

Support Facilities for Remedial Actions

Various support facilities are needed for the investigations of contamination and remedial actions. The facilities constructed to date include a field-support laboratory and an offsite decontamination pad for the decontamination of equipment used in remedial actions and investigations. Facilities to be constructed include a storage facility for waste from environmental restoration activities and a staging area.

Decommissioning

At present, only two facilities in the Paducah plant are scheduled for decommissioning the Metal Reduction Facility and the Feed Plant Complex. They are under routine surveillance and maintenance to preserve the integrity of the structures and provide containment for radioactive and hazardous waste.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration							
Assessment	10,507	14,632	22,894	6,632	4,644	4,637	4,793
Remedial Actions	33,629	51,076	51,677	32,786	42,006	7,577	106
Surveillance And Maintenance	971	3,679	3,546	4,002	2,783	440	1,646
GDP Decommissioning							
Assessment	1,765	1,331	852	731	0	0	0
Surveillance And Maintenance	245	469	0	0	0	0	0
Surveillance And Maintenance - (Post Stabilization)	0	0	0	3,285	1,066	0	0
Facility Decommissioning	0	0	14,265	31,121	98,650	120,157	108,132
Total	47,118	71,186	93,234	78,556	149,148	132,810	114,677

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration								
Assessment	497	302	34	0	0	0	0	358,358
Remedial Actions	229	1,263	590	2,812	378	0	0	1,154,273
Surveillance And Maintenance	3,771	0	0	0	0	0	0	105,156
GDP Decomissioning								
Assessment	0	0	0	0	0	0	0	25,154
Surveillance And Maintenance	0	0	0	0	0	0	0	3,816
Surveillance And Maintenance - (Post Stabilization)	0	0	0	0	0	0	0	21,755
Facility Decommissioning	106,779	70,990	61,221	0	0	0	0	3,056,571
Total	111,275	72,554	61,845	2,812	378	0	0	4,725,084

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Eventually, when uranium enrichment is no longer needed, the rest of the Paducah Plant will be shut down and subsequently decommissioned. Under the provisions of the lease with U. S. Enrichment Corporation, shutdown and stabilization activities are the responsibility of the leasee. All wastes and in-process uranium will be removed prior to decommissioning by the Department. Residual uranium will be removed from the interior of process equipment by mobile gaseous decontamination system, subsequent to that all contaminated process equipment will be transported to a single decontamination facility to be constructed and operated at the Oak Ridge Reservation.

After decontamination and volume reduction, the waste will be returned to the Paducah site for disposal. The process buildings remaining, after the removal of the process equipment and auxiliaries, will then be decontaminated. All of the interior surfaces are assumed to be contaminated. The facilities will be cleaned of radioactive and hazardous materials, and resultant material disposed of in appropriately designed disposal facilities. The major hazardous materials are asbestos in the insulation for the piping systems and transite siding of all buildings, and PCBs that are found throughout the electrical equipment, the ventilation systems of the process buildings, and in local areas of the floors in these buildings. The facilities will be treated to remove surface contamination for unrestricted release. Building materials like transite siding and roofing are likewise contaminated and are to be totally removed and disposed. All that will remain will be the superstructure of the facilities.

WASTE MANAGEMENT

Waste Treatment, Storage and Disposal

Waste management at Paducah is within the scope of environmental restoration activities. It entails managing waste generated from plant operation before July 1, 1993 (i.e., the "legacy" wastes), and waste generated by environmental restoration after July 1, 1993. The waste types include low-level radioactive waste, low-level mixed waste, hazardous waste, and industrial and sanitary waste.

Waste management activities at the Paducah Gaseous Diffusion Plant include characterizing of waste to ensure proper legal classification, including waste sampling and analysis; treatability studies for mixed waste; and packaging prior to shipment offsite. At present, low-level mixed waste is sent to an approved commercial facility in Utah for treatment and disposal. It is assumed, in the future, this waste will be sent to the incinerator at the K-25 Site in Oak Ridge, Tennessee. Any mixed waste not accepted at this incinerator will be shipped to approved commercial facilities. Oil contaminated with radionuclides will be managed as a mixed waste.

There are several existing waste storage areas at Paducah, with both interior and exterior storage in accordance with Resource Conservation and Recovery Act requirements. These include the C-746-Q Mixed Waste Storage Area, the Toxic Substances Control Act (TSCA) Phase I Storage Area, and the C-746-A and B Storage Facilities.

Two major storage projects at Paducah are scheduled for completion in FY 1996. These projects involve the construction of new facilities for storing mixed waste and TSCA waste. In addition, two fabric-membrane structures for the storage of low-level waste are to be constructed.

The Paducah Plant provides disposal only for sanitary and industrial waste. A landfill is available at the site for this waste.

Low-level radioactive waste is shipped to the Department's facilities at the Hanford Reservation in the State of Washington. It is assumed these shipments will continue.

Contaminated scrap metal and contaminated combustible materials are shipped to offsite commercial facilities. Mixed waste is sent to the TSCA incinerator at the K-25 Site where its ultimate disposal is the same as that assumed for other TSCA waste.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	8,084	8,851	9,265	2,985	6,165	21,922	15,151

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Program Management	16,640	12,319	12,785	7,671	0	0	0	617,270

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	47,118	71,186	93,234	78,556	149,148	132,810	114,677
Program Management	8,084	8,851	9,265	2,985	6,165	21,922	15,151
Total	55,202	80,037	102,498	81,541	155,313	154,732	129,828

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	111,275	72,554	61,845	2,812	378	0	0	4,725,084
Program Management	16,640	12,319	12,785	7,671	0	0	0	617,270
Total	127,916	84,873	74,631	10,483	378	0	0	5,342,353

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

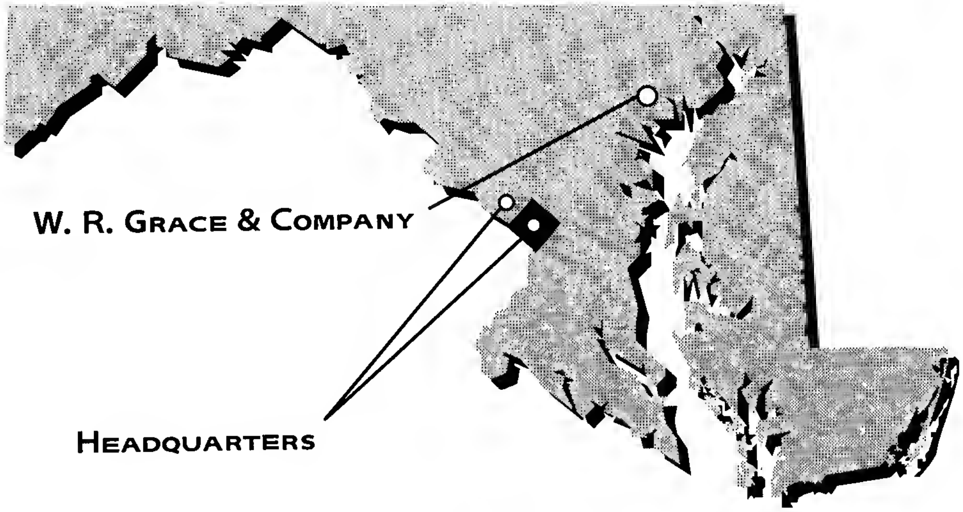
*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE Fiscal Year
Environmental Restoration		
	Subcontractor Staging Area - Complete Construction	1995
	C-400-C Nickel Stripper - Complete Construction	1995
	C-409 Pilot Plant - Complete Construction	1995
	C-403 Neutralization Pit Closure - Complete Construction	1995
	Well Abandonment - Complete Construction	1996
	N/S Ditch Design/Construction - Complete Construction	1996
	Waste Storage Facility-Phase I - Complete Construction	1996
	NW Plume-Containment PP/ROD - Complete Construction	1999
	NE Plume RI/FS - Complete Remediation	1999
	WAG 6 RFI Work Plan - Remediation Complete	2004
	WAG 22 RI/FS - Remediation Complete	2005
	WAG 23 Treatability Studies - Remediation Complete	2007
	WAG 13 RFI - Remediation Complete	2009
	WAG 17 RFI Field Work - Remediation Complete	2009
	WAGs 1 & 7 RI/FS - Remediation Complete	2015
	WAGs 2, 3, 14 RFI - Remediation Complete	2015
	WAGs 5, 11 RFI - Remediation Complete	2020
	Groundwater OU - Remediation Complete	2020
	Surface Water OU - Remediation Complete	2020
	WAGs 8, 9 RFI - Remediation Complete	2025
	WAG 18 RFI - Remediation Complete	2025
	WAG 19 - Remediation Complete	2025
	WAG 20 - Remediation Complete	2025
	WAG 21 - Remediation Complete	2025
	WAG 15 RFI - Remediation Complete	2025
	C-340 D&D - Complete D&D	2025
	C-410 D&D - Complete D&D	2030
	WAG 12 RFI - Remedation	2045
	WAGs 10, 16 RFI - Remediation Complete	2055

For further information on this site, please contact:

	Public Participation Office	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Robert Edwards	*(502) 462-2859*
	Bill Cahill	*(615) 241-4830*



MARYLAND / WASHINGTON, D.C.

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Maryland - FUSRAP	0	0	0	360	9,230	250
Headquarters	1,004,390	1,125,110	1,328,360	1,422,660	1,504,040	1,578,390
Total	1,004,390	1,125,110	1,328,360	1,423,020	1,513,270	1,578,640

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Maryland - FUSRAP	1,633	0	0	0	0	0	0
Headquarters	1,246,187	1,101,460	1,119,615	976,818	946,630	730,375	786,249
Total	1,247,820	1,101,460	1,119,615	976,818	946,630	730,375	786,249

	FY 2035	2040	2045	2050	2055
Maryland - FUSRAP	0	0	0	0	0
Headquarters	653,295	491,967	315,458	194,145	132,475
Total	653,295	491,967	315,458	194,145	132,475

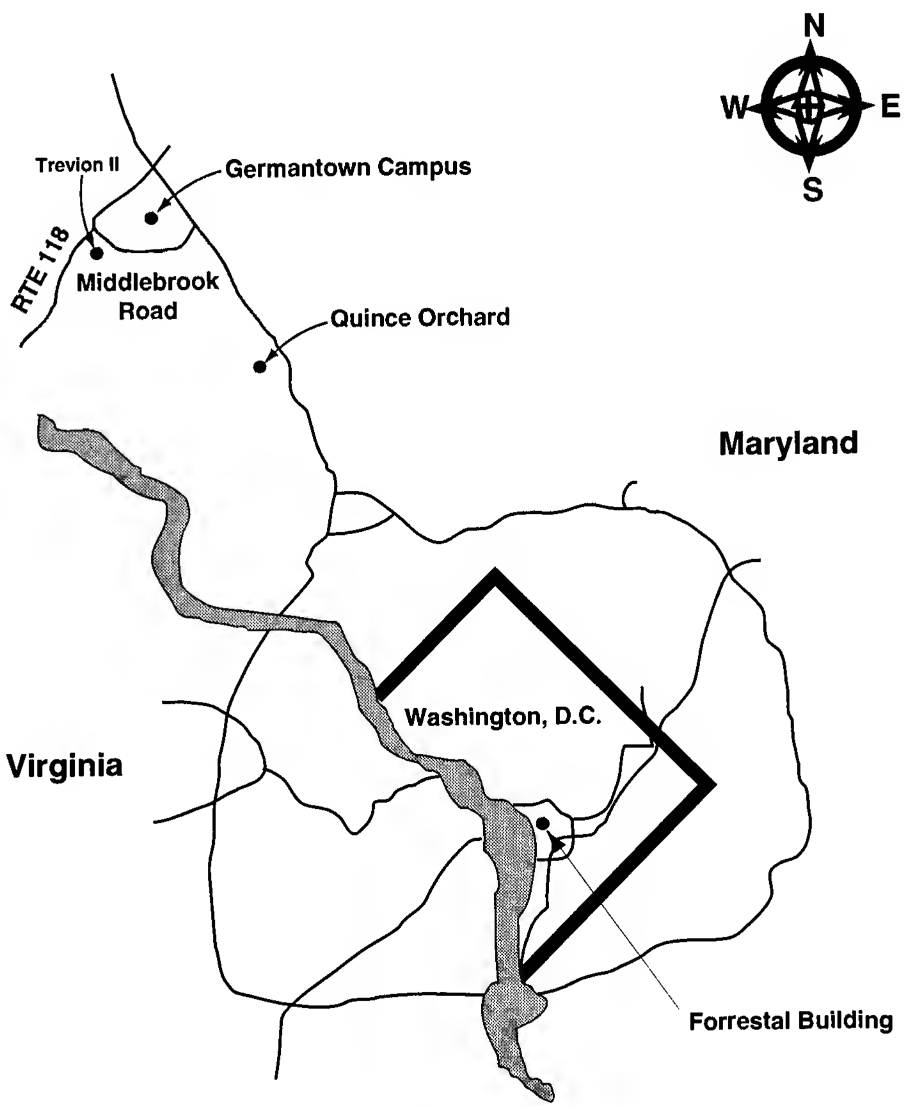
	FY 2060	2065	2070	2075	2080	Life Cycle***
Maryland - FUSRAP	0	0	0	0	0	9,797
Headquarters	40,423	4,616	4,479	3,145	3,155	44,998,643
Total	40,423	4,616	4,479	3,145	3,155	45,008,440

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

ENVIRONMENTAL MANAGEMENT PROGRAM HEADQUARTERS

The Environmental Management Headquarters staff is located in the Washington, D.C., metropolitan area. Senior managers, including the Assistant Secretary and staff, work in Washington, D.C., at the James Forrestal Building, which is in close proximity to other Federal agency Headquarters facilities, the White House, and Capitol Hill. The majority of the Environmental Management technical staff is located in facilities in nearby Germantown and Gaithersburg, Maryland.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Program Management	332,750	373,560	442,260	474,140	501,650	526,780
Program Direction	332,750	373,560	442,260	474,140	501,650	526,780
Technology Development	318,890	357,990	423,840	454,380	480,740	504,830
Transportation Management	20,000	20,000	20,000	20,000	20,000	20,000
Total	1,004,390	1,125,110	1,328,360	1,422,660	1,504,040	1,578,390

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	425,974	229,928	233,788	203,428	197,010	96,880	91,669
Program Direction	413,880	434,470	441,764	384,396	372,268	366,405	346,697
Technology Development	386,333	417,062	424,063	368,994	357,352	257,090	337,883
Transportation Management	20,000	20,000	20,000	20,000	20,000	10,000	10,000
Total	1,246,187	1,101,460	1,119,615	976,818	946,630	830,375	786,249

	2035	2040	2045	2050	2055	2060	2065
Program Management	75,968	56,917	36,663	22,337	15,054	4,183	250
Program Direction	287,316	215,261	138,660	84,478	56,934	15,821	945
Technology Development	280,011	209,789	135,135	82,330	55,487	15,419	921
Transportation Management	10,000	10,000	5,000	5,000	5,000	5,000	2,500
Total	653,295	491,967	315,458	194,145	132,475	40,423	4,616

	2070	2075	2080	2085	2090	2095	2100	Life Cycle***
Program Management	234	76	77	0	0	0	0	8,878,150
Program Direction	884	288	293	0	0	0	0	18,217,680
Technology Development	861	281	285	0	0	0	0	17,032,813
Transportation Management	2,500	2,500	2,500	0	0	0	0	870,000
Total	4,479	3,145	3,155	0	0	0	0	44,998,643

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE PROGRAM FUNCTION

The Environmental Management program was established on October 4, 1989, as a result of a Secretarial task force that assessed the Department of Energy's (DOE) defense waste management, environmental response, and cleanup activities. The program consolidated in one place environmental restoration and waste management activities formerly managed within Defense Programs, Nuclear Energy, and Energy Research. The Environmental Management program was originally organized as the Office of Environmental Restoration and Waste Management and which is now the Office of Environmental Management.

Today, the Environmental Management program has approximately 800 Federal employees at Headquarters and approximately 19,200 Federal employees in the field. Headquarters is responsible for providing direction, resources, and priorities to the field staff for the successful completion of safe and environmentally acceptable project and activities. The Headquarters staff acts as an information advocate providing analysis, options, and information to shape policy and strategy while advocating for the programs to Congress and the Office of Management and Budget. The Headquarters staff also acts as the national manager measuring performance and integrating field activities across the complex. The field Environmental Management staff is responsible for implementing Headquarters policy, guidance, and direction. The field staff ensures safe and environmentally acceptable operations and is responsible for day-to-day management of activities and resources.

Headquarters staff maintains ongoing and continuous communication with the field and is available to assist with site issues, when appropriate.

Some specific activities provided by Headquarters staff include:

- Establishing policy and conducting program reviews to ensure adherence to policy;
- Preparing a program-wide budget based on field input;
- Coordinating with Congress and other Federal agencies, including regulators (e.g., Environmental Protection Agency, Defense Nuclear Facilities Safety Board, Nuclear Regulatory Commission) on the national level;
- Coordinating with national stakeholder organizations, labor unions, industry groups, and environmental groups;
- Coordinating with State Governors (e.g., National Governors' Association, Western Governors' Association) and Indian Tribes;
- Managing national initiatives, such as Waste Minimization and Pollution Prevention, the National Low-Level Waste Program, the Transportation Management Program, and the Federal Facility Compliance Act task force;
- Managing the Technology Development program;
- Overseeing site-safety programs;
- Preparing national reports, such as this report, the Waste Management Programmatic Environmental Impact Statement, and the Integrated Risk Study; and
- Developing program strategic plans, including developing options and new strategies.

FUNDING ASSUMPTIONS

For purposes of developing life-cycle cost estimates for the Baseline Environmental Management Report, the assumption was made that financial accounts originated at Headquarters would be continued to be estimated as such. The national accounts of Technology Development, Program Direction,

Headquarters. In fact, after the accounts have been established at Headquarters, the majority of these accounts are eventually allocated to the field locations. The following is a brief description of these accounts, and their relative distribution to field operations.

PROGRAM DIRECTION

Program Direction provides funding to pay for all Federal full-time equivalents at Headquarters and the field offices. The program direction accounts provide funding for salaries, benefits, travel, and training. Approximately 75 percent of this account is reallocated to field operations.

PROGRAM MANAGEMENT

Program Management/Support activities at Headquarters provide general technical contractor support services for all elements of the Headquarters Environmental Management directed activities. Approximately 70 percent of this account is transferred to field operations.

TRANSPORTATION MANAGEMENT

The transportation program provides for DOE-wide development and implementation of effective strategies, techniques, methods, and policy guidance for safe, secure, efficient, and cost-effective transportation of DOE materials, including hazardous materials, particularly radioactive, hazardous substances, and hazardous and mixed wastes. Approximately 95 percent of these funds are transferred to field operations for the development of agency-wide logistics management tools, training, and technology to address DOE transportation and packaging requirements. Baseline Environmental Management Report estimates for waste transportation costs are calculated within the cost estimates for waste management and environmental restoration.

TECHNOLOGY DEVELOPMENT

The Technology Development program is responsible for managing an aggressive national program for applied research, development, demonstration, testing, and evaluation for environmental cleanup, waste management, and related technologies. Approximately 91 percent of this account is transferred to field operations.

The Office of Environmental Management has structured its technology development program to focus on the five major problem areas discussed below. A wide spectrum of individuals participates in management of these programs, including Headquarters, field, technology users, regulators, and other stakeholders. The goal is to maximize development of technologies that are cost-effective, accepted, and ultimately used.

Mixed Waste Characterization, Treatment, and Disposal

Available technologies are inadequate from technical and/or regulatory standpoints. Mixed waste goals are to perform radioactive demonstrations as early as possible and to pursue versatile treatment technologies (e.g., plasma, molten metal, and vitrification) as well as nonthermal treatment options.

Radioactive Tank Waste Remediation

Many tanks are leaking, and characterization, retrieval, and treatment are technically difficult. Tank goals are to develop technology for analyzing tank structural integrity and tank waste, to develop and demonstrate technologies for retrieval of radioactive materials from tanks, and to develop radioactive extraction technologies. These activities will decrease risk and reduce volume of waste for disposal.

Contaminant Plume Containment and Remediation

Goals for this focus area are to develop the capability to treat soil inplace and ground-water contaminated with heavy metals or dense nonaqueous phase liquids, and to develop technology to control the spread of contaminated plumes.

Landfill Stabilization

Landfill goals are to develop technology for containment and in situ stabilization of buried waste and to develop technology for retrieval, characterization, contaminant control, and subsequent treatment of landfill waste. These activities will result in systems that reduce risk to the public and workers, and decrease remediation cost.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	425,974	229,928	233,788	203,428	197,010	96,880	91,669
Program Direction	413,880	434,470	441,764	384,396	372,268	366,405	346,697
Technology Development	386,333	417,062	424,064	368,994	357,352	357,090	337,883
Transportation Management	20,000	20,000	20,000	20,000	20,000	10,000	10,000
Total	1,246,187	1,101,460	1,119,615	976,818	946,630	830,375	786,249

	2035	2040	2045	2050	2055	2060	2065
Program Management	75,968	56,917	36,663	22,337	15,054	4,183	250
Program Direction	287,316	215,261	138,660	84,478	56,934	15,821	945
Technology Development	280,011	209,789	135,135	82,330	55,487	15,419	921
Transportation Management	10,000	10,000	5,000	5,000	5,000	5,000	2,500
Total	653,295	491,967	315,458	194,145	132,475	40,423	4,616

	2070	2075	2080	2085	2090	2095	2100	Life Cycle**
Program Management	234	76	77	0	0	0	0	8,878,150
Program Direction	884	288	293	0	0	0	0	18,217,674
Technology Development	861	281	285	0	0	0	0	17,032,813
Transportation Management	2,500	2,500	2,500	0	0	0	0	870,000
Total	4,479	3,145	3,155	0	0	0	0	44,998,643

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

For further information on this site, please contact:

	Public Participation Office	*(202) 586-7633*
	Public Affairs Office	*(202) 586-5820*
	Technical Liaison: Terry Tyborowski	*(202) 586-6302*

MARYLAND FUSRAP SITES

The W. R. Grace and Company facility is the only Maryland site within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and Atomic Energy Commission sites to reevaluate their radiological condition and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States and is funded through the Oak Ridge Operations Office. The model used to estimate costs for this report provides one cost for all of the FUSRAP sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs, see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Maryland - FUSRAP	0	0	0	360	9,230	250

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Maryland - FUSRAP	1,633	0	0	0	0	0	0	9,797

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

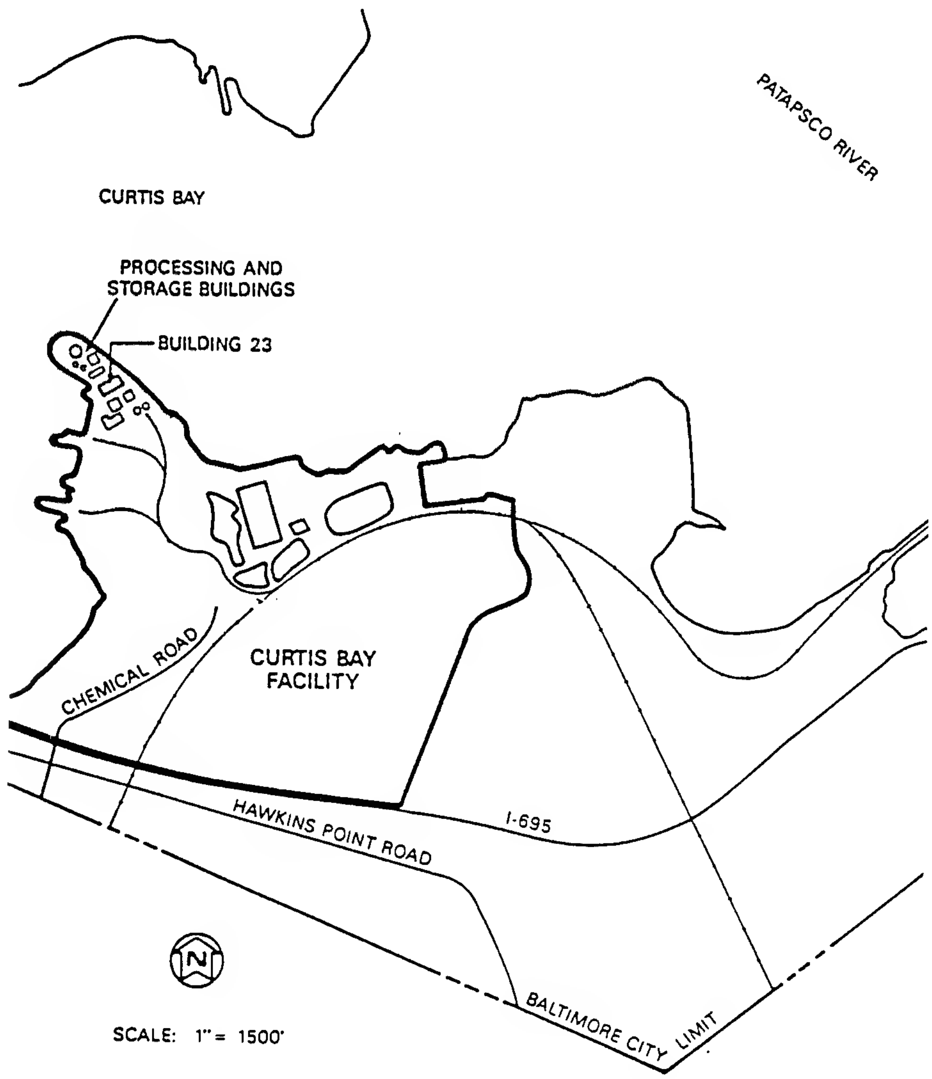
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	1,633	0	0	0	0	0	0	9,797

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

W.R. GRACE AND COMPANY
(Formerly Utilized Sites Remedial Action Program)

The W.R. Grace and Company site is a 260-acre former thorium-processing facility located in Curtis Bay, Maryland.



PAST, PRESENT, AND FUTURE MISSIONS

In 1955, Rare Earths, Inc. contracted with the Government to extract thorium and rare earths from naturally-occurring monazite sands. W.R. Grace assumed ownership of the site and continued operations until 1958. Approximately 998 tons of thorium ore were processed at the facility. Thorium development work was conducted in one building (No. 23), and the wastes were buried onsite in an area covering about 4 acres. The disposal area is a few hundred feet south of Curtis Bay and is bordered on the south and west by a Baltimore and Ohio Railroad spur running over the Grace property.

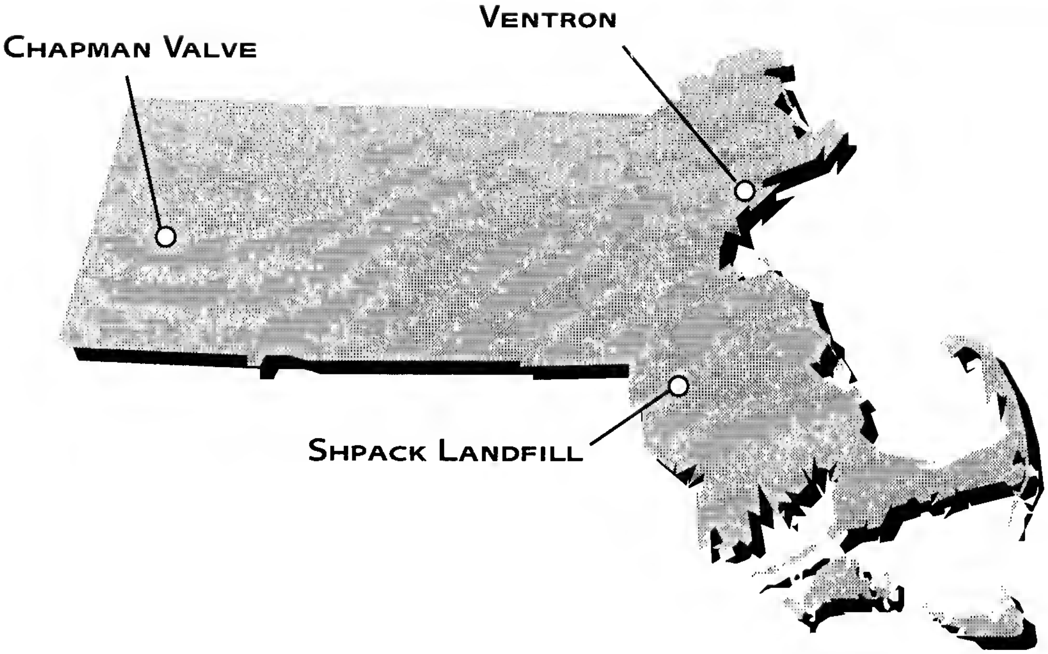
Future use of this site depends on the outcome of the remedial action decision documents.

ENVIRONMENTAL RESTORATION

Surface contamination has been detected at all levels of the building and equipment. Some building renovation has been conducted, and the waste material is currently stored onsite. Limited remedial investigation/action has been conducted at the site.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*



MASSACHUSETTS

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Massachusetts - FUSRAP	2,300	1,550	6,130	7,780	180	0

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Massachusetts - FUSRAP	2,977	0	0	0	0	0	0	17,865

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

MASSACHUSETTS FUSRAP SITES

Chapman Valve, Shpack Landfill, and Ventron constitute the Massachusetts sites within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and Atomic Energy Commission sites to reevaluate their radiological condition and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States and is funded through the Oak Ridge Operations Office.

The model used to estimate costs for this report provides one cost for all of the FUSRAP sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs, see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Massachusetts-FUSRAP	2,300	1,550	6,130	7,780	180	0

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Massachusetts-FUSRAP	2,977	0	0	0	0	0	0	17,865

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

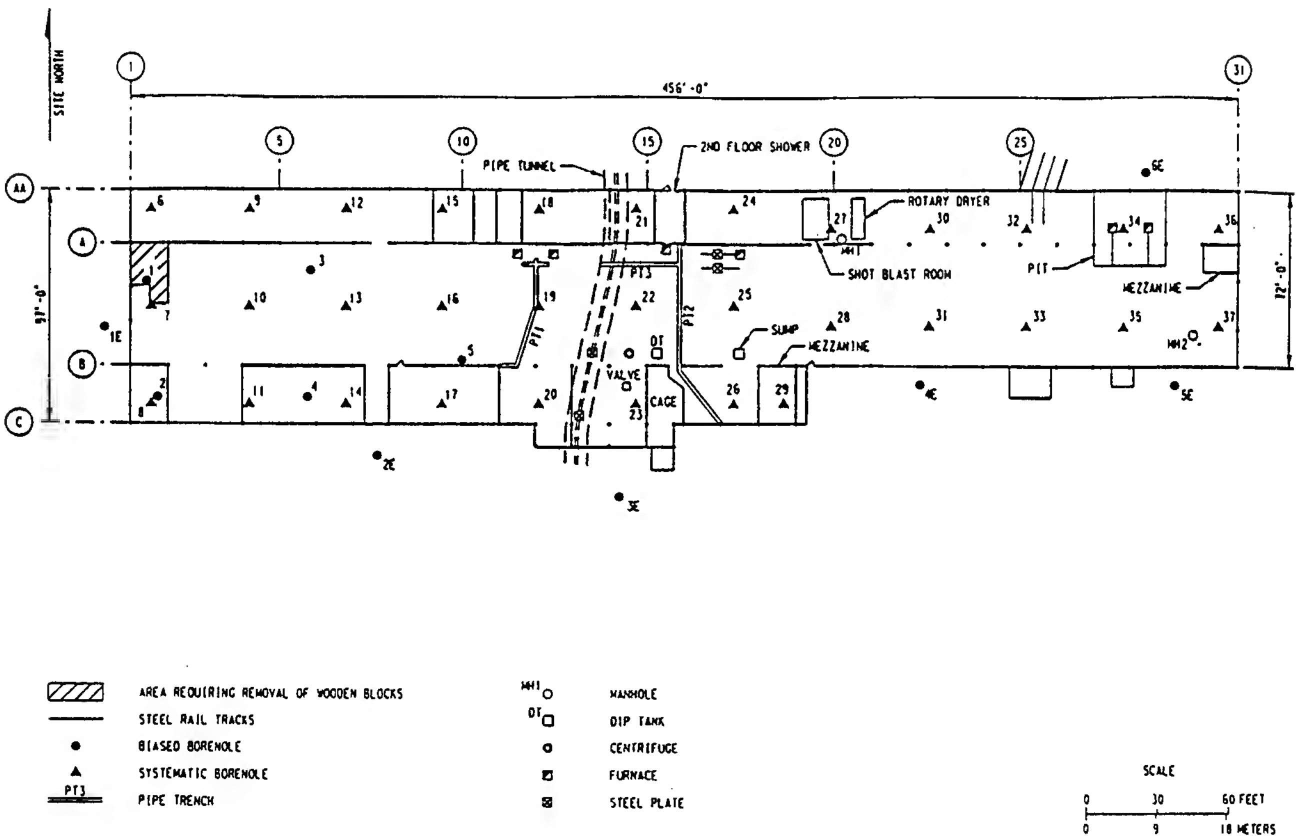
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Massachusetts-FUSRAP	2,977	0	0	0	0	0	0	17,865

*Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

**Total Life Cycle is the sum of annual costs in constant 1995 dollars.

CHAPMAN VALVE
(Formerly Utilized Sites Remedial Action Program)

The Chapman Valve site is located in Indian Orchard, a suburb of Springfield, Massachusetts.



PAST, PRESENT, AND FUTURE MISSIONS

From January to November 1948, the facility machined uranium for Brookhaven National Laboratory in Building 23. Approximately one-third of the building was separated for machining operations by a floor-to-ceiling wooden partition more than 50 feet high, creating a space 200 feet in length and 60 feet in width. This partition has since been removed. The building has been vacant since 1987 when the current owner discontinued all manufacturing at Indian Orchard. The site will be released for unrestricted use following completion of cleanup.

ENVIRONMENTAL RESTORATION

Following the uranium processing activities, which ceased in November 1948, the site was decontaminated to levels acceptable at that time. Today's more stringent cleanup guidelines prompted the Department of Energy to designate Chapman Valve a FUSRAP site in 1992. The waste volume is estimated to be 100 cubic yards of low-level waste (uranium-contaminated debris and soil).

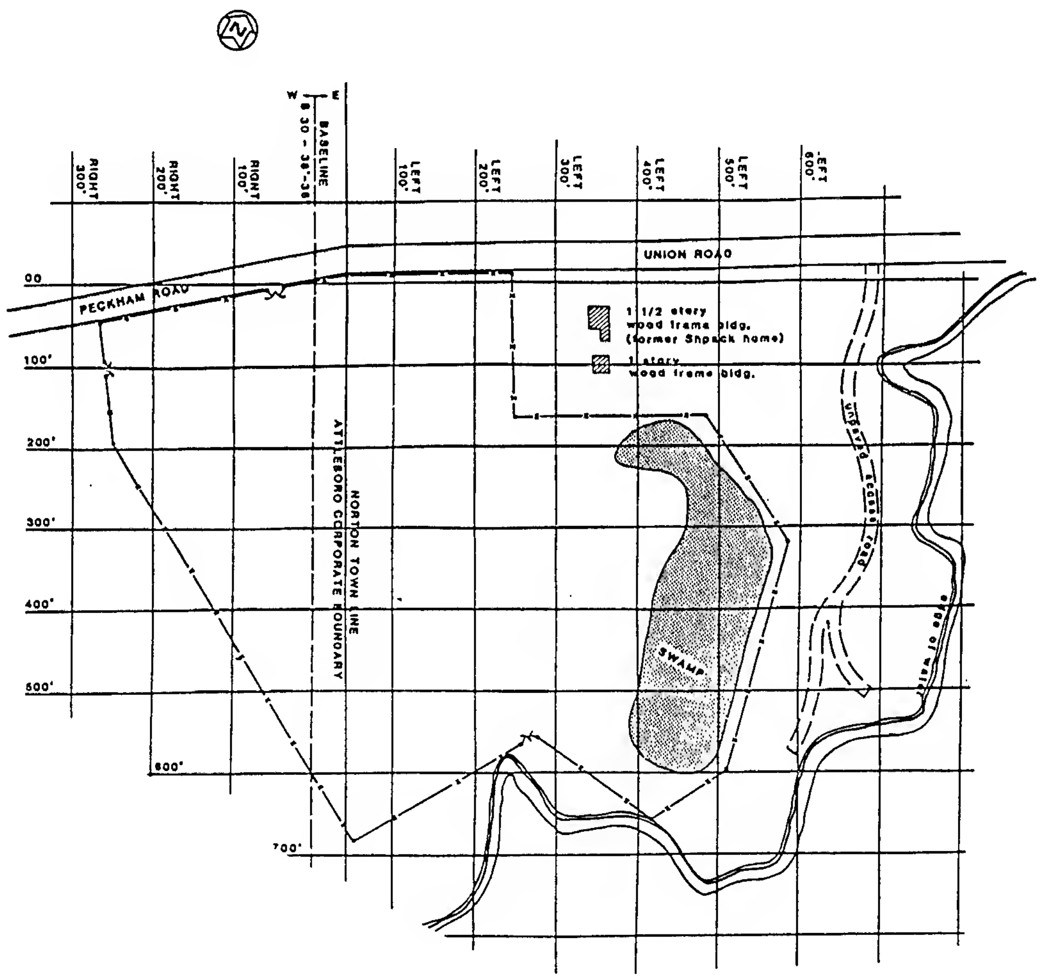
No remedial action has been conducted at the site to date.

For further information on this site, please contact:

	Public Participation Office	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*

SHPACK LANDFILL
(Formerly Utilized Sites Remedial Action Program)

The Shpack Landfill site covers about 8 acres. About 5.5 acres lie within the boundaries of the Town of Norton, and the remaining 2.5 acres lie within the Town of Attleboro.



PAST, PRESENT, AND FUTURE MISSIONS

The Shpack Landfill was a private landfill that received "industrial" waste contaminated with radioactive residues from local operations. Some radioactive waste was associated with Department of Energy (DOE) predecessors. Chemical as well as radioactive wastes were disposed of at the private dump site.

Enriched uranium was found at this site in the early 1980's. DOE conducted an emergency removal and took possession of the uranium. Currently, DOE is supporting the potentially responsible party in the remedial investigation.

Future use of this site depends on the resolution of the Comprehensive Environmental Response, Compensation, and Liability Act process that is underway.

ENVIRONMENTAL RESTORATION

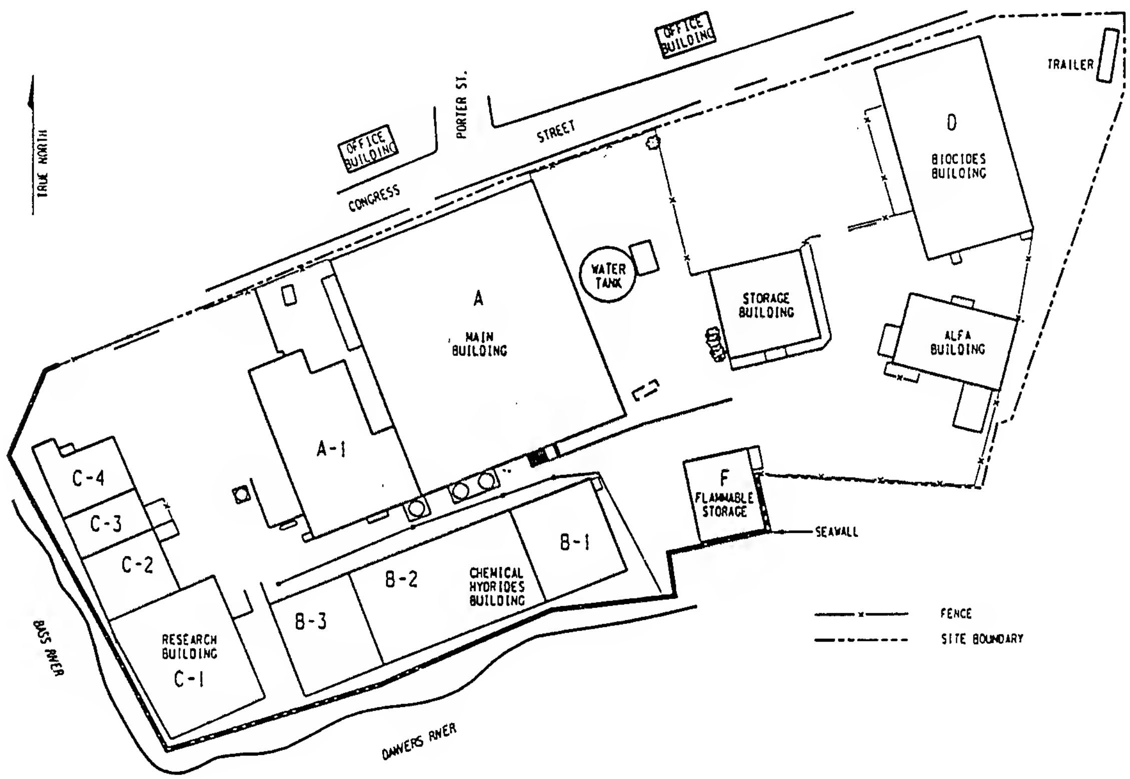
The waste volume is estimated to be 9,370 cubic yards and consists of uranium residues and radium. A security fence was installed around the site in October 1981. The site is on the Environmental Protection Agency's National Priorities List.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

VENTRON
(Formerly Utilized Sites Remedial Action Program)

The Ventron site is located in Beverly, Massachusetts.



PAST, PRESENT, AND FUTURE MISSIONS

From 1942 to 1948, the Metal Hydrides Corporation was under contract to the Manhattan Project and the Atomic Energy Commission to convert uranium oxide to uranium metal powder. This procedure and later operations involving the recovery of uranium from scrap uranium and turnings from the fuel fabrication plant at the Hanford Reservation, were conducted at the foundry site in Beverly, Massachusetts.

During contract operations, three buildings were used for uranium work. As a result of a 1948 Atomic Energy Commission radiation survey, two wooden buildings that housed the foundry facilities were demolished sometime between 1948 and 1950. Two other buildings have since been erected at these locations. The remaining original building, Building A, contained furnace and leaching facilities, a mixing room, a drying room, and an analytical laboratory. The fate of the rubble from the two demolished buildings (including equipment, platforms, etc., from within the buildings) is unknown. Ocean dumping was the method recommended for disposal of the contaminated rubble and equipment, but confirmation of the actual disposal could not be obtained.

The Metal Hydrides Corporation became the Ventron Corporation in 1965, and in late 1976, Morton Thiokol, Inc., acquired control of the company. Today, the Ventron Facility remains under the control of Morton Thiokol, Inc., and operations ceased in 1995.

Future use of this site depends on resolution of the decision documents for cleaning up the site.

ENVIRONMENTAL RESTORATION

The Oak Ridge National Laboratory conducted a screening survey of the site in 1977. Based on the results of the Oak Ridge National Laboratory's measurements, it was determined that a radiological survey of the entire site was needed. A radiological designation survey of the outdoor portion of the site was conducted in 1980, and the buildings and structures on the site were surveyed in 1982. In May 1991, surveys of the vicinity properties found them to be free of contamination. In 1992, the Department of Energy completed initial site characterization.

The waste volume is estimated to be 5,000 cubic yards of low-level radioactive waste. The major contaminant is uranium. The Department has conducted initial remedial action at the site including some interior decontamination and the replacement of the main building roof.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

MICHIGAN

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Michigan - FUSRAP	1,100	190	90	0	0	0

* Costs for FY 1995 reflect Congressionel Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Michigan - FUSRAP	230	0	0	0	0	0	0	1,383

** Costs reflect e five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

MICHIGAN FUSRAP SITES

General Motors is the only Michigan site within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and Atomic Energy Commission sites to reevaluate their radiological condition and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States and is funded through the Oak Ridge Operations Office.

The model used to estimate costs for this report provides one cost for all of the FUSRAP sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs, see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	1,100	190	90	0	0	0

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded eree assume 3% ennuel inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	230	0	0	0	0	0	0	1,383

** *Costs reflect e five-yeer everege in constent 1995 dollers, except in FY 1995 - 2000, which is e six-yeer everege.*

*** *Total Life-Cycle is the sum of ennuel costs in constent 1995 dollers.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	230	0	0	0	0	0	0	1,383

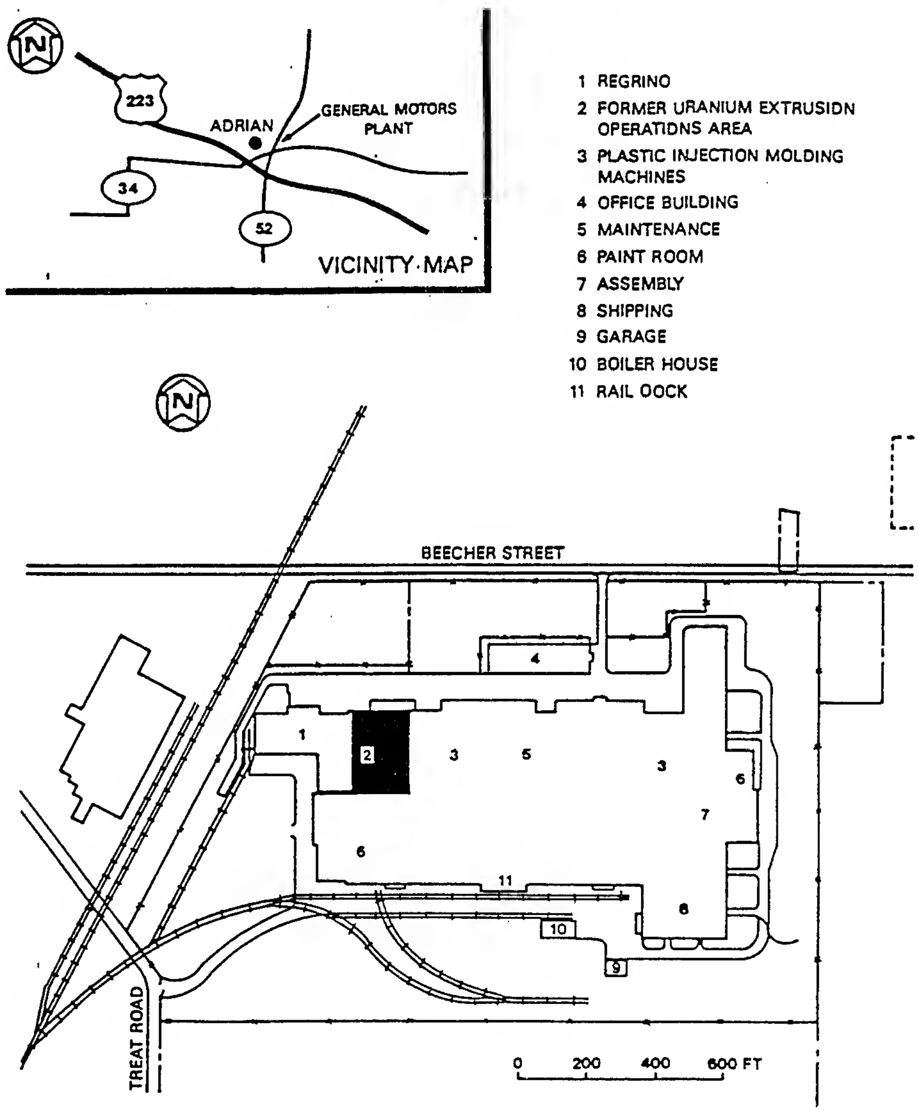
** Costs reflect e five-yeer everege in constent 1995 dollers, except in FY 1995-2000, which is e six-yeer everege.*

***Totel Life Cycle is the sum of ennual costs in constent 1995 dollers.*

****Costs shown do not include progrem menegement costs.*

GENERAL MOTORS
(Formerly Utilized Sites Remedial Action Program)

The General Motors site is located in Adrian, Michigan.



PAST, PRESENT, AND FUTURE MISSIONS

The facility started out in 1941 as an aluminum extrusion plant making parts for the U.S. Army Air Force. During the 1950's, the Bridgeport Brass Company, a division of National Distillers and Chemical Corporation, operated a Special Metals Extrusion Plant in Adrian, Michigan, under contract with the Atomic Energy Commission. The product of this operation was material for uranium fuel elements for reactors at the Hanford Reservation and at the Savannah River Plant. The work included a semi-production pilot plant and developmental extrusion work on thorium and depleted, natural, and slightly enriched (up to 2.1 percent) uranium. Only a small fraction of the overall facility was involved in support of the Atomic Energy Commission work. At the completion of work by the Bridgeport Brass Company, one large extrusion press was shipped to Reactive Metal, Inc., in Ashtabula, Ohio. The plant was sold to Martin Marietta Corporation in the early 1960's. It was used by that company until 1974, when it was sold to General Motors, Chevrolet Manufacturing Division.

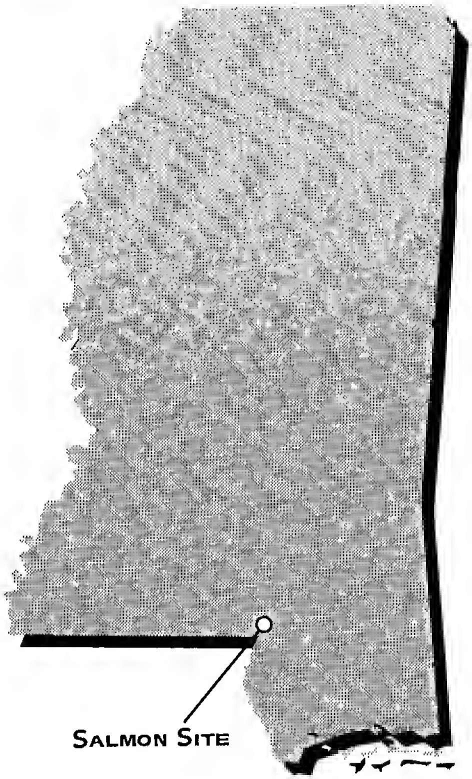
Future plans are to remediate this site in FY 1995, and return it for use without radiological restrictions.

ENVIRONMENTAL RESTORATION

Earlier cleanup/decontamination efforts removed the majority of the contamination. Most of the remaining contamination is in drain lines under the facility. The waste volume is estimated to be 200 cubic yards and consists of uranium residues.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*



MISSISSIPPI

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Mississippi - Salmon	750	2,000	150	150	150	100

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Mississippi - Salmon	520	50	36	30	20	16	10	3,924

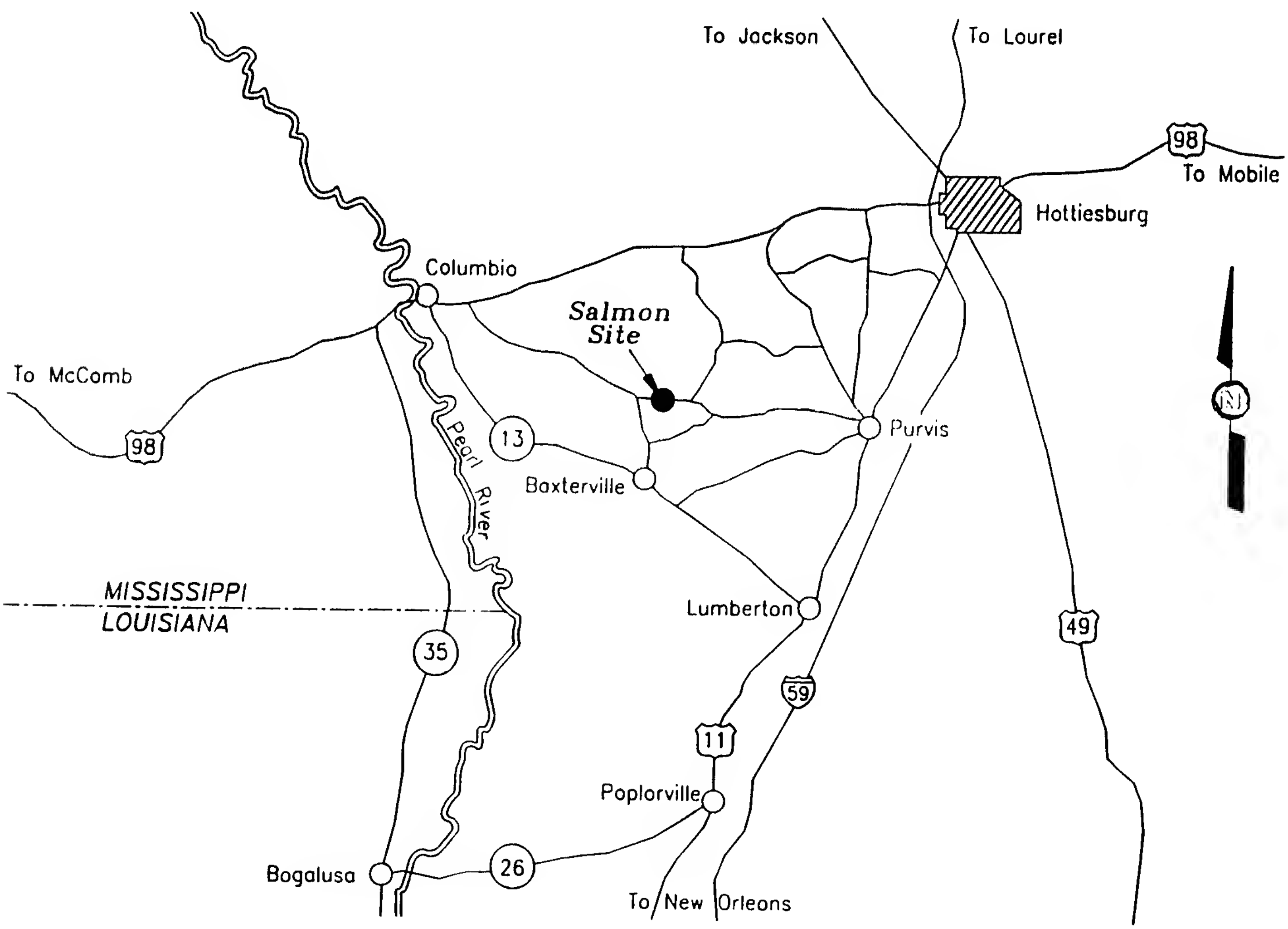
** Costs reflect a five-year everege in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

SALMON SITE
(Nevada Offsite Program)

The Salmon Site is administered by the Nevada Operations Office. A more thorough description of the environmental activities managed by the Nevada Operations Office can be found in the Nevada Test Site narrative. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no offsites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent defense.

The Salmon Site, located 21 miles (34 kilometers) southwest of Hattiesburg, Mississippi, was used for the Salmon and Sterling tests, as well as for nonnuclear gas detonations in the Miracle Play program.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	750	2,000	150	150	150	100

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

Environmental Restoration	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
	520	50	36	30	20	16	10	3,924

** *Costs reflact a fiva-yaar average in constant 1995 dollars, axcept in FY 1995 - 2000, which is a six-year average.*

*** *Total Lifa Cycla is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The Salmon and Sterling tests were conducted to evaluate the seismic response of dome salt to nuclear explosives. The Miracle Play program tests were conducted to provide data for seismic decoupling studies. The Salmon test was conducted at a depth of 2,717 feet (828 meters) in the Tatum Salt Dome in October 1964. The Sterling test was detonated in the Salmon cavity in December 1966. The Miracle Play program consisted of two methane-oxygen explosions conducted in the Salmon/Sterling cavity and included Diode Tube in February 1969 and Humid Water in April 1970. Following testing, there was a cleanup operation that included soil excavation and recovery, and decommissioning of facilities. Sampling in the vicinity of the dome initiated in 1972 confirmed the presence of radioactivity that had been injected into the Cook Mountain Limestone. The results indicated radioactivity is contained onsite and the potential for offsite migration is low. An extensive monitoring program was instituted in 1977, with more than 170 exploratory borings, extensive soil sampling and analysis, and ground-water sampling.

ENVIRONMENTAL RESTORATION

Funding provides for the implementation of a Remedial Investigation/Feasibility Study and, subsequently, the method to be chosen to remediate the Salmon site. The Remedial Investigation/Feasibility Study will address the tritium plume in the shallow aquifer; determine if the contaminants in the shot cavity are leaking through the plugged placement hole or

the plugged drillback holes; and determine if the contaminants injected into the deep, nonpotable aquifer are migrating into the next higher aquifer through the plugged injection or monitoring wells or through channels in the clay layer separating the two aquifers. The Remedial Investigation effort will include characteriziation of the nature and extent of any contamination found, a detailed site characterization, and a risk assessment to determine the potential threat to human health and the environment. The Feasibility Study will identify the applicable, relevant, and appropriate requirements and assess alternative remediation strategies.

The Remedial Investigation/Feasibility Study will include installation of ground-water monitoring wells; soil and ground-water sampling and laboratory testing; biota sampling and analysis; risk analysis; identification of applicable, relevant, and appropriate regulations; development of treatment alternatives; screening of those alternatives; postscreening field investigation; detailed analysis of postscreening alternatives; and selection of an appropriate risk-based remediation alternative. The extent and magnitude of contamination will be further defined, and an appropriate remedial action will be taken as required by the regulatory authority. Any requirements for site cleanup or long-term monitoring will be part of this activity. For this estimate, remediation was assumed to include removal of the buried mud pits at surface ground zero and the contaminated surface soils associated with disposal activities at the Reynolds Electric and Engineering Company, Inc. Pits on the Salmon site. The remediation activities were assumed to begin in 1995 and be completed in 1999.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	223	0	0	0	0	0	0	1,339
Remedial Actions	281	0	0	0	0	0	0	1,685
Surveillance And Maintenance	16	50	36	30	20	15	10	899
Total	520	50	36	30	20	15	10	3,924

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-FY 2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	520	50	36	30	20	15	10	3,924

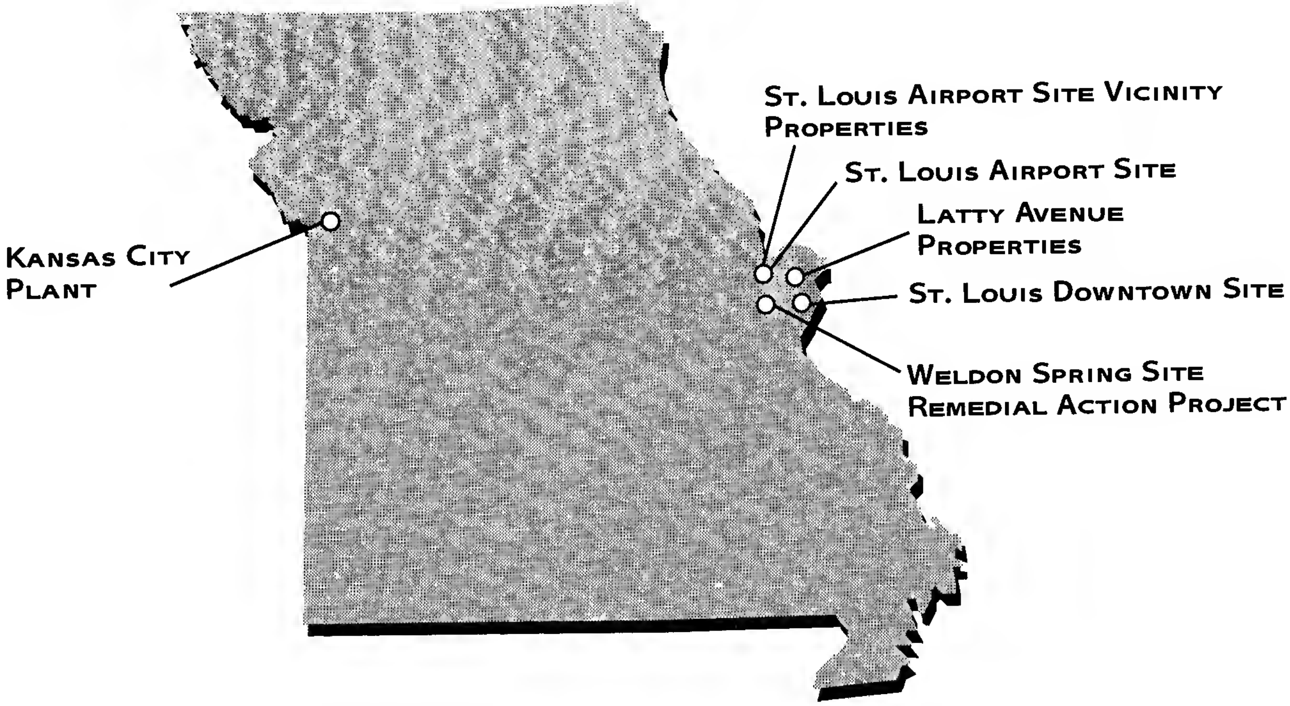
* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Complete Assessment	1998
	Complete Remediation	1999
	Complete Surveillance & Maintenance	2055

For further information on this site please contact: *Public Participation Office* (702) 295-4652
Public Affairs Office (702) 275-3521
Technical Liaison: Bobbie McClure (702) 295-1862


St. Louis Airport Site Vicinity Properties
St. Louis Airport Site
Latty Avenue Properties
Kansas City Plant
St. Louis Downtown Site
Weldon Spring Site Remedial Action Project

MISSOURI

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Kansas City Plant	11,818	18,116	19,212	19,853	26,104	25,952
Weldon Spring Site	55,000	67,500	65,600	65,500	80,100	69,000
Missouri-FUSRAP	17,230	28,740	23,420	43,580	53,920	51,160
Total	84,048	114,356	108,232	128,933	160,124	146,112

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Kansas City Plant	17,692	10,711	11,157	11,454	11,560	11,670	10,207
Weldon Spring Site	62,166	17,750	0	0	0	0	0
Missouri-FUSRAP	36,198	27,536	13,739	16,363	6,015	0	0
Total	116,056	55,998	24,896	27,817	17,575	11,670	10,207

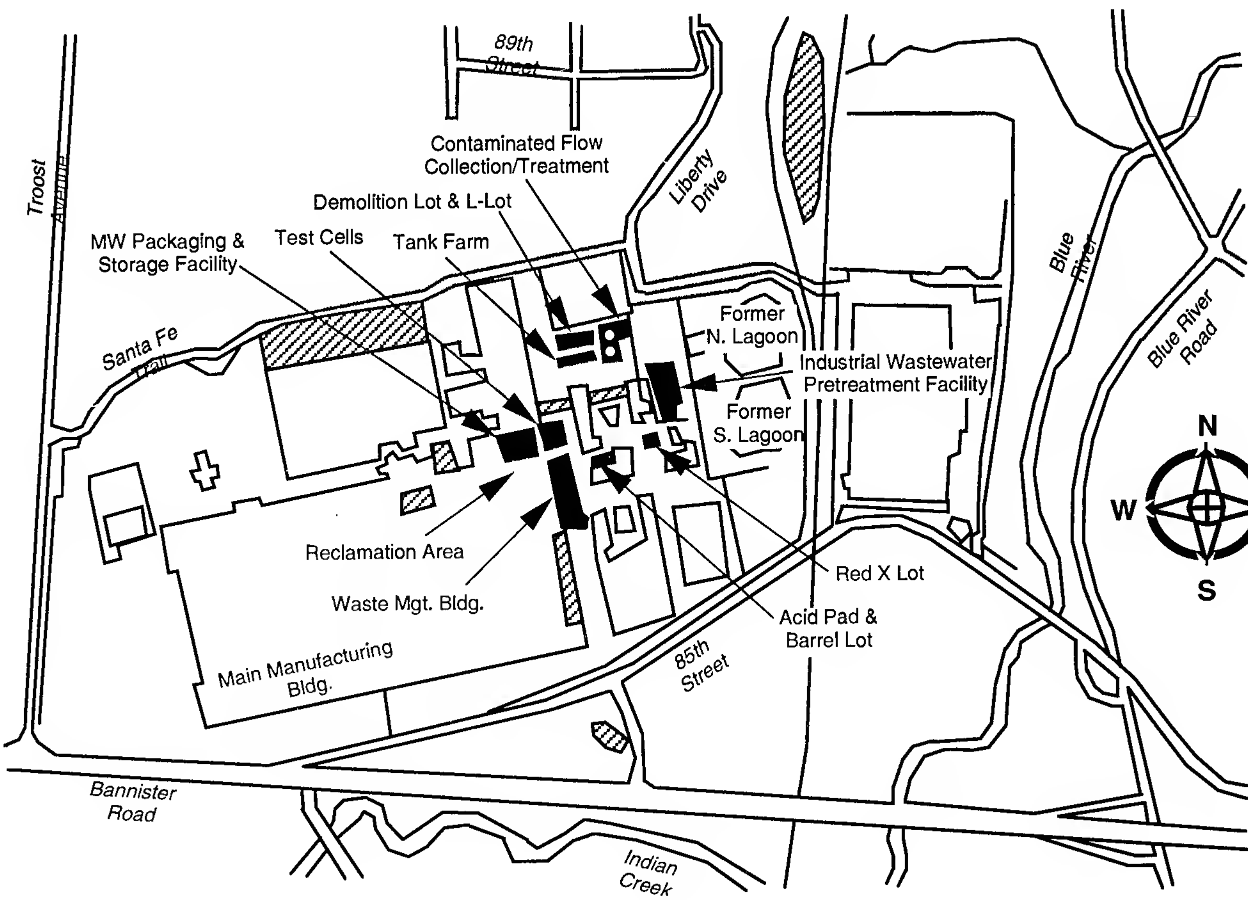
	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Kansas City Plant	31	0	0	0	0	0	0	440,097
Weldon Spring Site	0	0	0	0	0	0	0	461,750
Missouri-FUSRAP	0	0	0	0	0	0	0	535,450
Total	31	0	0	0	0	0	0	1,437,297

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

KANSAS CITY PLANT

The Kansas City Plant is part of the Bannister Federal Complex, which occupies a 300-acre site 12 miles south of downtown Kansas City, Missouri. The plant occupies 141 acres of this reservation. In addition to the Department of Energy (DOE), the other occupants of the complex are the General Services Administration, the Department of Defense, the Federal Aviation Administration, the National Oceanic and Atmospheric Administration, and the Internal Revenue Service. The complex is zoned for heavy industry while the surrounding area consists of single- and multiple-family dwellings, commercial establishments, industrial districts, and public use lands.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	3,478	9,212	7,760	6,934	9,928	14,960
Waste Management	6,116	5,650	7,920	9,226	11,352	6,400
Program Management	2,225	3,254	3,532	3,693	4,824	4,592
Total	11,818	18,116	19,212	19,853	26,104	25,952

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	7,968	1,396	1,618	1,766	1,819	1,874	1,930
Waste Management	7,186	6,332	6,332	6,332	6,332	6,332	5,072
Program Management	2,538	2,984	3,207	3,356	3,409	3,464	3,205
Total	17,692	10,711	11,157	11,454	11,560	11,670	10,207

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	0	0	0	0	0	0	0	99,822
Waste Management	25	0	0	0	0	0	0	226,898
Program Management	6	0	0	0	0	0	0	113,377
Total	31	0	0	0	0	0	0	440,097

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The Kansas City Plant was established in 1942 to build aircraft engines for the Navy. After World War II, it was used for storage and in 1949 was selected for manufacturing nonnuclear components for nuclear weapons. In the early 1960's, the General Services Administration began warehouse operations in the western portion of the building.

The plant has been selected as the facility in which all of the Department's nonnuclear manufacturing for nuclear weapons will be consolidated. It is assumed that this mission will continue indefinitely.

ENVIRONMENTAL RESTORATION

The main sources of contamination at the Kansas City Plant resulted from accidental spills and leaks during manufacturing. These spills and leaks have contaminated soils with volatile organic compounds, polychlorinated biphenyls (PCBs), and petroleum hydrocarbons. Some of these contaminants, mainly the volatile organics, have migrated through the soil and have contaminated the ground water. The soil consists mainly of clayey-silt down to bedrock at about 40 feet. Ground-water treatment began in 1988 and is continuing.

Forty-one solid-waste management units were originally identified at the Kansas City Plant. Twenty-seven of these have either been remediated or found to require no further action. Remedial actions at the remaining units will be completed by FY 2001, as required by the consent order between the Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA). However, the funding levels in the Environmental Restoration Projects table may not be sufficient to implement the consent order with the specified remediation technologies. If the remediation technology agreed to by EPA cannot be funded in the targeted year, the schedule in the consent order will be renegotiated.

Each active environmental restoration project is described below. For most of these projects, the assumed remediation technology is soil excavation and offsite disposal.

Department 26: Southeastern Quadrant of Main Manufacturing Building

PCB-contamination of subsurface soils was suspected at this location due to the heat-transfer fluid (Therminol FR-1) that had been used in the Department 26's plastics molding operations. The PCBs were released when spills occurred (e.g., piping system leaks). In 1974, the heat-transfer fluid was replaced with a non-PCB bearing fluid, and Department 26 remains operational. The soils beneath the floor will be excavated to a depth of 20 feet and shipped to an approved chemical waste landfill for disposal.

Department 27 (Inside): Northeastern Quadrant of Main Manufacturing Building

The presence of PCBs was suspected in the subsurface soils beneath this quadrant because of the past use of Therminol FR-1 to control the temperature of molds used to form rubber and filled elastomer components. Leaks in the heat-transfer system may have allowed the PCBs to seep into the underlying soil through joints and cracks in equipment foundation pits. Therminol FR-1 was replaced with a non-PCB fluid in 1974. Department 27 remains operational.

The assumed remediation technology is excavation and offsite disposal. Remediation will entail the decommissioning and relocation of production equipment; the decommissioning, demolition, and disposal of interior walls and partitions; the decommissioning of the concrete slab above the basement area; excavation to 20 feet below the existing floor; and restoration of the floor slab and utilities. The contaminated soils will be shipped to an approved landfill for disposal.

Miscellaneous Contaminated Soils

This project involves four potentially contaminated areas including the north lot, building 16, the abandoned fuel lines, and the loading and unloading area for fuel-oil tanks.

The northwest corner of the plant's north parking lot was apparently used as a staging area before being converted to paved parking space. An old aerial photograph shows drums in this area. The contents of the drums, their disposition, and the occurrence of any leaks or spills from these drums are unknown. Another old photograph shows a blackened area on the ground surface that may have been used as a burn area.

Building 16 houses an in-ground centrifuge used to test weapon components and a mold-flushing facility. The concrete centrifuge chamber has a sump where water and hydraulic fluid from equipment leaks have accumulated. The mold-flushing facility includes a below-grade storage area for spent flushing solvents. A 3,000-gallon steel tank is buried outside the building to capture fire-sprinkler water from mold flushing. These three areas are considered potential sources for soil contamination.

The abandoned fuel lines were installed when the Kansas City Plant was constructed in the early 1940's. The network of buried pipes was used to transfer fuels, kerosene, oils, rust inhibitors, and solvents from truck and railcar unloading stations to underground storage tanks and from tanks to the main manufacturing building.

The fuel-oil tanks consist of two aboveground 400,000-gallon steel tanks, a loading-and-unloading area, and associated piping. The tanks were constructed to store jet fuel and were later converted to store No. 6 fuel oil. Although the tanks were initially surrounded by an earthen berm to contain spills, the berm has been replaced by concrete walls. The floor of the containment area has always consisted of unlined earth. The loading and unloading area was originally designed for railcars, but in the mid-1980's rail lines were removed and the area was converted for tanker/truck access.

Petroleum products were occasionally spilled on the ground at the loading and unloading area. In-tank steam coils were used to heat the No. 6 fuel oil, and, during the winter of 1989, a leaking pipe inside the north tank allowed steam condensate to enter the tank, causing the tank to overflow and spill fuel oil onto the floor of the containment area.

Miscellaneous PCB Sites

This project includes an electrical substation and underground ductbank that are suspected to be contaminated with PCBs. Although the substation is currently being used, it is scheduled to be replaced by a new substation in another location. The substation is housed in a small shed attached to the north side of the manufacturing support building.

A release of PCBs is thought to have been caused by a lightning strike at the substation. While the source of PCBs in the electrical ductbank west of the east boilerhouse is not known, the source could be a substation or the 1950's-vintage lead-jacketed high-voltage cable inside the ductbank. This cable was known to contain electrical insulation made of PCB-impregnated paper.

Decommissioning, demolition, and disposal of building structures and electrical components is the approved remediation approach. Interim remediation is in progress.

Northeast Area and the Outfall 001 Raceway

The northeast area encompasses the northeastern portion of the Kansas City Plant and includes lands administered by the General Services Administration, the Internal Revenue

Service, and the Union Pacific Railroad. Ground-water contamination here is principally trichloroethylene and its degradation products, 1, 2-dichloroethene and chlorothene. A number of activities may have been the source of contamination, but the actual release events and sequence are unknown. Possible sources of contamination include random dumping in an area of low relief, dumping in unlined pits, dumping in an unlined trench that once crossed the area, leaking pipelines, and a wastewater lagoon.

The 001 Outfall is the discharge point for the 001 storm sewer system draining the north central and northeastern portions of the Kansas City Plant. It passes through an area of ground water and soil contamination derived from past waste handling practices (i.e., dumping), which, according to old aerial photographs, occurred from the late 1940's through the 1950's. The area has also been affected by past discharges through the 001 stormwater outfall. In addition, surface soils have been affected along an open drainageway of the outfall between two railroad tracks.

Old aerial photographs show ponds in and just north and west of the former north lagoon. This area was originally low lying and poorly drained. Photographs indicate that material was dumped in the area from makeshift haul roads. Both liquid and solid materials appear to have been deposited.

Plating Building

The plating building was constructed in 1957 to provide onsite metal plating. It was taken out of service after a new facility was constructed in 1987. Portions of its structure, including concrete floors and walls, were found to contain heavy metals, PCBs, cyanide, and total petroleum hydrocarbons. This project covers remediation of building 57, the waste-oil tank, substation 18, and Department 26 outside sites.

Building 57 was a steel building constructed on a concrete foundation in 1957. The building was demolished during the period from 1989 through 1990, and the site was paved over with asphalt.

An abandoned 26,000-gallon waste-oil tank is buried under the north foundation wall of building 57. This tank was constructed in 1942 to recover spent anti-rust oil from operations in the main manufacturing building. The tank was abandoned and filled with sand in the early 1950's. Sampling indicates the tank contents are contaminated with PCBs, possibly from spills from substation 18. The soil immediately around the tank is also saturated with petroleum, probably from leaks in the piping for the oil-recovery system.

Substation 18 was constructed in 1957 to provide electrical power for the plating building. It included an oil-filled transformer containing approximately 750 gallons of PCB-based cooling oil (Aroclor 1260). Multiple spills occurred and were cleaned up during the 30-year operation of the building. The PCB transformer was removed from this substation in 1989 when the plating building was demolished. PCB contamination from this management unit may have migrated into the waste oil tank and into surrounding soil.

A heating-and-cooling system for injection molding in Department 26 area was constructed in 1965. This system was located in the gap immediately outside the west and south walls of the plating building. A buried 10,000-gallon tank supplied a PCB heat-transfer fluid (Therminol FR-1) for the system. The PCBs seem to have migrated to bedrock in some locations. The tank and piping system was removed and replaced with a PCB-free system in 1983. Remediation will require soil removal to depths ranging from 10 feet to bedrock (40 feet). The total quantity of contaminated soil is estimated to be 12,000 tons.

South Lagoon

The South Lagoon is in the northeast quadrant of DOE's property. It was constructed in 1975 to assist the North Lagoon in receiving industrial wastewaters from the Kansas City Plant and was in operation until 1988. The industrial wastewater system carried rinse waters, drain input, and treated cooling waters from various processes, including electroplating and degreasing.

Ground-Water Treatment and Monitoring

Ground-water monitoring in support of remedial activities is required by the Resource Conservation and Recovery Act (RCRA). At the Kansas City Plant, contaminant migration from the points of release is tracked over the entire site. The tracking uses monitor wells installed for the various remediation activities. This project also covers the treatment of three plumes of contaminated ground water. The treatment system uses ultraviolet light and hydrogen peroxide to treat ground water pumped from production wells. Effluent from this system is discharged to the city sanitary sewer under a pretreatment permit.

Trichloroethylene Still Area

The trichloroethylene still area contains multiple release sites: the former trichloroethylene still, the classified waste burial trenches, the oil house, Department 95, the former aluminum-chip handling facility, the former sales building, the waste-transfer spill area, the abandoned sump, and the Department 20 sump.

The former trichloroethylene still is on the east end of the main manufacturing building. From 1950 to 1952, the north end of the dock was used for a solvent recovery still to reclaim spent solvents, primarily trichloroethylene. Solvent contamination has been found to the full depth to bedrock (40 feet) beneath this area. The assumed remediation technology is excavation and disposal of 876 tons of contaminated soil.

The burial trenches for classified waste were located in the area known as the barrel lot. Little information about the burials is available because the project was classified, and the burial occurred in the early 1950's. This is within the area of influence of the existing ground-water treatment system, and it is assumed that no further soil removal will be required.

The oil house is mainly used to store oil and coolants in drums and cans. Occasionally, solvents have also been stored there. Shallow trenches in the floor were used to capture and contain spills. Trench overflows were directed to a gravel-filled pit on the north side of the building. The trenches have been plugged for at least 15 years, and current operations are not considered a source of contamination. The assumed remediation technology is excavation and disposal of 454 tons of contaminated soil.

The former waste transfer spill area was reportedly located south of Building 89. An employee stated that liquid waste was brought to the site from other areas at the Kansas City Plant in metal containers and transferred to two 500 to 750 gallon holding tanks. The liquid waste transferred at this site were thought to be coolants, solvents, oil, paint, and kitchen grease. During transfer operations, unknown quantities of liquids were reported to have been spilled. This site was in operation sometime between 1955 and 1979. The assumed remediation technology is excavation and disposal of 2,520 tons of contaminated soil and debris.

The abandoned sump is located between Buildings 89 and 96, immediately east of the waste-transfer spill area and is covered with a large concrete slab. The assumed remediation technology is excavation and disposal of 315 tons of contaminated soil and debris.

The Department 20 sump was a concrete pit that housed a vapor degreaser that used trichloroethylene to clean parts manufactured in Department 20 from the mid-1960's to mid-1980's. The vapor degreaser unit was known to have leaked during its use. This unit has been removed, and the sump has been filled with sand and capped with concrete. The assumed remediation technology is demolition, excavation, and disposal of 81 tons of contaminated soil and debris.

Sump in the Maintenance Vehicle Repair Shop

There are four areas of concern associated with the sump of the maintenance-vehicle repair shop: the sump pits, building 54, a reported underground tank, and the test cell area.

The sump pits were built in 1970 to house a hydraulic vehicle lift. Vehicles used and repaired at the Kansas City Plant were routinely washed on the lift before repair. It was reported in 1990 that the pits would almost fill up with wastewater from the washes, but would never overflow. The lift has been decommissioned.

Building 54 was constructed to test jet engines. The building's basement housed electric motors used to circulate water through cooling towers. An underground concrete vault west of the building served as a sump for the cooling tower.

An underground tank has been reported southeast of Building 54. Previous sampling has indicated a potential problem with hazardous constituents in its vicinity.

Sampling has also indicated a possible release of hazardous constituents near the test cells. These cells were constructed in the early 1940's. Although little is known about their early uses, it is likely that the use of fuels, oils, and degreasers was widespread during peak manufacturing. The assumed remediation technology is excavation and offsite disposal.

WASTE MANAGEMENT

The Kansas City Plant generates classified and nonclassified hazardous waste and small quantities of low-level radioactive waste as well as low-level mixed radioactive waste. The principal hazardous substances include acids, alkalies, ignitable waste, miscellaneous toxic

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	40	0	0	0	0	0	0	239
Remedial Actions	7,928	1,396	1,618	1,766	1,819	1,874	1,930	99,583
Total	7,968	1,396	1,618	1,766	1,819	1,874	1,930	99,822

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

waste, nonfriable asbestos, oil, PCBs, solvents, wastewater-treatment sludge, and medical infectious waste from the employee medical department.

The plant provides temporary onsite storage, but hazardous wastes are neither treated nor disposed of at the site. Hazardous waste is transported for offsite treatment to approved commercial treatment and disposal facilities. The disposal of liquid and solid sanitary waste is the responsibility of the landlord (Defense Programs).

In 1993, the hazardous waste generated at the Kansas City Plant totaled 26,124.4 metric tons, most of which, 25,339 metric tons, was waste regulated by the Toxic Substances Control Act (TSCA), and 768 metric tons was waste regulated by RCRA. The remaining 17.4 metric tons was State-regulated waste. Hazardous waste generation is expected to continue at the present rate. The quantity of low-level radioactive waste was only 0.121 cubic meter and is expected to be minimal in the future, with an estimated annual generation rate of .06 to .015 cubic meters per year.

Radioactive Waste

The Kansas City Plant does not generate any high-level radioactive waste. Small quantities of low-level radioactive and low-level mixed waste are generated by the disassembly and testing of irradiated components, scheduled replacements of exit signs that contain small amounts of tritium for illumination, the replacement or excess of x-ray sources, and mixed-waste segregation (chemical "depotting" process).

Low-level waste is shipped to the Nevada Test Site for disposal. Shipments are made infrequently, when a sizable quantity of waste accumulates. The last shipment was made in 1985, and another is expected in FY 1995. At present approximately 330 cubic feet of classified and unclassified low-level waste is in storage.

Since FY 1994, the plant has aggressively pursued a plan to eliminate all mixed waste in storage. To this end, a chemical process has been used to segregate the radioactive and hazardous components from electronic assemblies. This eliminated two mixed-waste streams. In July and August 1994 the plant established a vendor-return program for smoke detectors, thereby preventing the generation of a mixed waste containing transuranic radionuclides. These approaches will continue to be applied in an effort to reduce the potential for creating mixed wastes.

Major Waste Management Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Modify Demolition Lot	167	0	0	0	0	0	0	1,000
Replace Industrial Waste Piping	500	0	0	0	0	0	1,000	8,000

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

NOTE: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

Hazardous Waste

The major contributors of hazardous waste are machining, plating and etching processes, and degreasing operations. Used oil from metal machining and equipment lubrication contributes to the waste totals and is managed as hazardous waste under Missouri regulations.

The numerous laboratories and small departments within the plant also generate miscellaneous hazardous waste in small amounts. These items are combined, when practical, for controlled disposal. Waste contaminated with PCBs and asbestos is also routinely generated in cleanup and the decommissioning of inactive facilities. Waste containing PCBs is shipped off the site for disposal every 30 days.

The Kansas City Plant does not treat any hazardous waste regulated by RCRA. The only treatment that is performed at the site is the pretreatment of wastewater (dilute acid, caustic, cyanide, chrome, and industrial wastes) from manufacturing. The pretreatment is performed at the industrial wastewater pretreatment facility, which destroys or removes hazardous chemicals like cyanide and chromium. The pretreatment facility also dewaters sludge, reducing its volume. The sludge is shipped to a licensed disposal site.

Resource recovery and recycling are performed at various locations throughout the plant, with the wastewater piped to the pretreatment facility. To make these activities more efficient, the Department is considering a consolidated resource-recovery facility for future funding. It will consolidate all resource-recovery activities that generate wastewater in one location, conveniently near the industrial wastewater pretreatment facility.

At present, storage for hazardous waste is provided at a tank farm, which contains five bulk storage tanks for acids, alkalies, solvents, and oil and at various locations in the plant. All hazardous-waste storage, except for the tank farm and the storage of lead-acid batteries at the L-lot, will be consolidated into an enclosed area.

Waste Management Activities

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Low-Level Waste	408	360	360	360	360	360	294
Hazardous Waste	6,778	5,972	5,972	5,972	5,972	5,972	4,778
Total	7,186	6,332	6,332	6,332	6,332	6,332	5,072

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Low-Level Waste	25	0	0	0	0	0	0	13,044
Hazardous Waste	0	0	0	0	0	0	0	213,854
Total	25	0	0	0	0	0	0	226,898

* *Costs reflect e five-year average in constant 1995 dollers, except in FY 1995-2000, which is e six-yeer everege.*

** *Total Life Cycle is the sum of ennuel costs in constant 1995 dollers.*

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Kansas City Plant.

LANDLORD ACTIVITIES

The Department's Office of Defense Programs is the landlord at the Kansas City Plant and is responsible for associated costs and activities.

PROGRAM MANAGEMENT

Program management cuts across all activities at the site. Additional continuity-of-operations elements to be incorporated in outyears include maintenance of waste-certification program (FY 2001-2005), evaluation of generator reporting effectiveness (FY 2006-2010), (FY 2011-2015), and program management update and review (FY 2011-2015).

Area Support

Area Support programs have site-wide applicability and include environmental, safety, health, quality assurance, training, emergency management, fire protection, centralized engineering and maintenance, procurement of capital equipment, and safeguards and security activities.

Regulatory Support

Regulatory Support programs provide environmental regulatory oversight and programmatic guidance; ensure compliance with pertinent environmental regulations and laws; disseminate regulatory guidance and notices received from regulatory agencies; represent issues on site-wide task terms and committees; coordinate roles, responses, or actions for the Federal Facility Agreement Operable Unit Groupings; coordinate external surveillance's, audits, or appraisals; and coordinate participation in scheduled meetings with the regulators.

Operations Integration

Operations Integration programs develop, implement, and conduct training programs as required by DOE Order 5480.20 to ensure that personnel and subcontractors have satisfied all training requirements. In addition, the programs establish and maintain performance expectations, measurements, and reports; provide Total Quality, Award Fee, Milestone, Commitments, and Issue Tracking programs support; provide subcontract coordinator review, processing, and status of purchase orders and requisitions; review, storage, and maintenance of documents; and prepare, review, implement, and maintain procedures.

Program Integration and Planning

Program Integration activities include the development of near- and long-term plans for the management of all waste streams as identified in the Waste Management Plans. Near-term integration activities include the maintenance of the technical privatization contracts and initiatives, and implementation of an interim storage strategy and a container management plan. Long-term activities include performing pre-conceptual project activities, such as studies required to establish a path forward for the development of future line item projects. Program planning activities include the management of the Solid Waste Life-Cycle Baseline, the development of Annual Operating Plans, Outyear Budgets, and associated

schedules, and the preparation of routine reports, such as the Progress Tracking System report and the Baseline Environmental Management Report.

Quality Assurance

This includes quality assurance activities for environmental restoration. The quality assurance group will divide its activities between the quality engineering functions and the quality systems functions. The quality engineering functions include providing support projects with regard to quality assurance requirements; reviewing and approving project and procurement documents; validating and closing various types of deficiency reports; conducting assessments; and performing periodic, management-initiated surveillance. The quality systems functions will include developing and maintaining Quality Assurance program and implementing procedures; trending and tracking conditions identified as adverse to quality until corrective action has been verified and the related report is closed; maintaining Quality Assurance regulatory requirements; coordinating external audits and waste management audits; and performing self-assessments.

Federal Facility Compliance Act Management

The Kansas City Plant will continue the development, testing, and implementation of mixed waste treatment technologies to be applied to mixed waste streams at other DOE sites.

Waste Minimization

This includes coordinating the development, promotion, implementation, and reporting of site-wide waste reduction activities. Waste reduction is an integral part of site operations with the waste-generating line organization having ultimate responsibility for implementation and funding of waste reduction activities. Activities include establishing site-wide recycling and source reduction programs

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	2,538	2,984	3,207	3,356	3,409	3,464	3,205

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Program Management	6	0	0	0	0	0	0	113,377

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

for all waste streams. Near-term objectives are to reduce the disposal volume of sanitary, hazardous, and low-level waste streams. Objectives by the year 2000 include the reduction of total releases of toxic chemicals to the environment; offsite transfers of such chemicals for treatment and disposal; and the reduction of the volume of newly generated (non-legacy decommissioning and environmental restoration waste) low-level, hazardous, and sanitary waste streams through continued waste stream characterization. Reductions are to be achieved by source reduction to the maximum extent practicable.

Public Participation

The Kansas City Plant Public Participation program consists of a bi-monthly newsletter, plant tours, community surveys, access to regulatory deliverables, stakeholder meetings, and a community involvement group. Due to the nature of the environmental risk at the plant, public concern has been minimal.

Program management services are tracked and charged through the budgets for waste management and environmental restoration activities. For the purposes of this report, 20 percent of the site's budget has been allocated for program management activities for FY 1995-FY 2000.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Kansas City Plant.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	7,968	1,396	1,618	1,766	1,819	1,874	1,930
Waste Management	7,168	6,332	6,332	6,332	6,332	6,332	5,072
Program Management	2,538	2,984	3,207	3,356	3,409	3,464	3,205
Total	17,674	10,711	11,157	11,454	11,560	11,670	10,207

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	0	0	0	0	0	0	0	99,822
Waste Management	25	0	0	0	0	0	0	226,898
Program Management	6	0	0	0	0	0	0	113,377
Total	31	0	0	0	0	0	0	440,097

* Costs raflact a fiva-yaar avaraga in constant 1995 dollars, excapt in FY 1995-2000, which is a six-yaar avaraga.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

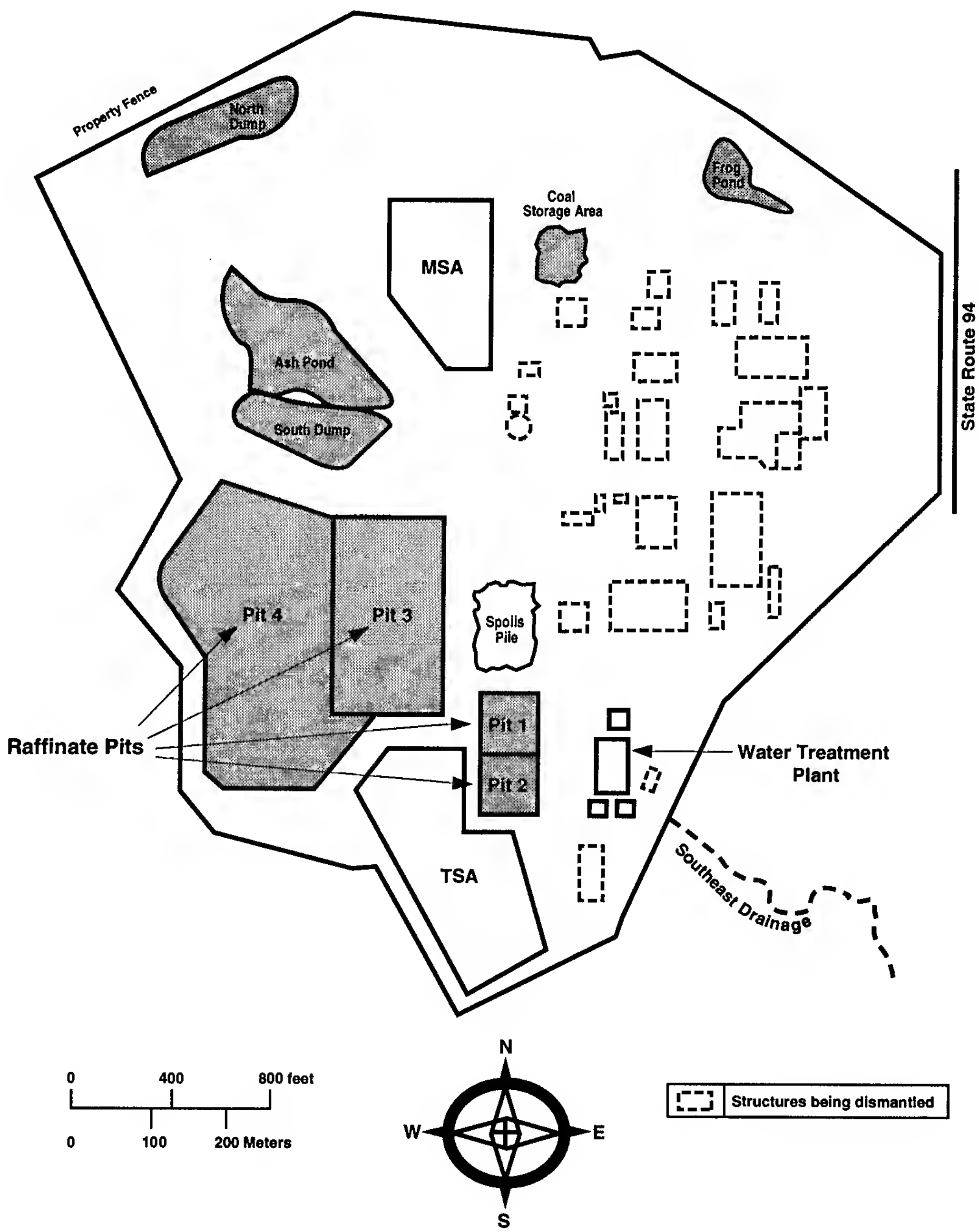
ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration:		Fiscal Year
Department 26	Complete Remediation	2000
Department 27	Complete Remediation	1999
Maintenance Shop Sump	Complete Remediation	2000
Ground-Water Treatment and Monitoring	Complete Remediation	2001
Miscellaneous Contaminated Sites	Complete Remediation	2000
Miscellaneous PCB Sites	Complete Remediation	1998
Northeast Area/Outfall 001	Complete Remediation	1999
Plating Building	Complete Remediation	2000
TCE Still Area	Complete Remediation	2000
Kansas City Plant	Complete Environmental Restoration	2030
Waste Management:		Fiscal Year
Operations	Submit Final Site Treatment Plan to the State of Missouri	1995
Operations	Replace Waste Acid and Alkaline Tanks	1996
Modi Demolition Lot	Complete Modification of Demolition Lot	1997
Replace Industrial Waste Piping	Complete Replacement of Industrial Waste Piping	1998
	All Waste Management Activities Complete	2029

For further information on this site, please contact:

Public Participation Office	*(505) 845-5951*
Public Affairs Office	*(505) 845-6202*
Technical Liaison: Diane Solcher	*(816) 997-5118*

WELDON SPRING SITE REMEDIAL ACTION PROJECT

The Weldon Spring site is about 30 miles west of St. Louis, Missouri. The site consists of 229 acres.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	33,300	43,900	42,500	42,700	59,300	49,600
Program Management	21,700	23,600	23,100	22,800	20,800	19,400
Total	55,000	67,500	65,600	65,500	80,100	69,000

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	41,755	10,556	0	0	0	0	0	303,312
Program Management	20,411	7,194	0	0	0	0	0	158,438
Total	62,166	17,750	0	0	0	0	0	461,750

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Weldon Spring was part of a site used by the U.S. Army as an ordnance works in the 1940's. In the 1950's and 1960's, the Atomic Energy Commission used the site for processing uranium ore in the Weldon Spring chemical plant. The plant was subsequently inactivated and no activities were carried out at the Weldon Spring site until remediation was undertaken.

The U.S. Environmental Protection Agency placed the site on the National Priorities List in 1989. The current mission for Weldon Spring is to eliminate potential hazards to the public and the environment. The Department of Energy (DOE) is conducting a comprehensive remedial action program to complete this mission. The cost of the cleanup for the chemical plant is shared by the Department of the Army; which is currently contributing 22 percent of the overall funding for the project.

Remedial action at Weldon Spring is scheduled for completion in 2003. A section of the site will be used as a permanent disposal area for wastes resulting from cleanup of the site. This area will continue to be monitored after remedial action is completed. Future plans are to make surplus real property available for other uses to the extent practicable. The landlord at the site is DOE's Environmental Management program.

ENVIRONMENTAL RESTORATION

To support the remedial actions at Weldon Spring, DOE conducts radiological, chemical, and geotechnical investigations including extensive site characterizations to determine the type and extent of contamination. Investigations will continue as monitoring activities after remedial action is completed.

Contamination is found in three major areas at the Weldon Spring site including an old quarry site approximately three miles south of the raffinate pits, four waste lagoons (raffinate pits), and the chemical plant. Some contamination is also present in adjacent ("vicinity") properties.

The quarry is a 9-acre site that was used in the 1950's and 1960's for the disposal of waste generated by uranium-ore processing. It contains 126,630 cubic yards of soil and rubble contaminated with radionuclides and 3 million gallons of water contaminated with radionuclides and chemicals. These contaminated materials will be removed from the quarry, treated, and disposed of in the onsite disposal facility. Additional residual contamination in the quarry will be removed following initial remediation, depending on the results of further assessment and monitoring. Quarry restoration will be complete by FY 2002.

The four waste lagoons were used to store contaminated residue from uranium-ore processing. They contain 407,930 cubic yards of raffinate sludge and contaminated soil. They also contain 57 million gallons of contaminated water. The raffinate sludge and contaminated soil will be excavated, treated, and disposed of in the onsite disposal facility. The raffinate pits remediation will be completed by FY 2001.

The chemical plant is a complex of 44 buildings and other structures where uranium ore was processed. It contains 347,996 cubic yards of contaminated soil and building materials. The buildings and structures are being dismantled, and the surrounding soils excavated as appropriate. All waste and contaminated materials will be treated and disposed of in the onsite disposal facility. Dismantling of 43 of the buildings and structures has been completed and the building foundation will be removed by FY 1998. The remaining structure is a Resource Conservation and Recovery Act material storage building and will be dismantled in FY 1999.

Approximately 25,400 cubic yards of contaminated soil is present at the vicinity properties beyond the boundaries of the Weldon Spring site. They include lakes and wildlife areas contaminated from the runoff of uranium during plant operations. The lake waters, however, show no discernable levels of contamination. Contaminated soil will be excavated and hauled to the onsite disposal facility for storage until it can be placed in the permanent disposal facility. Surface and ground waters will continue to be monitored for the foreseeable future. The vicinity properties will be remediated by FY 2000.

WASTE MANAGEMENT

Waste management at Weldon Spring is conducted as part of ongoing environmental restoration activity. A record of decision signed in September 1993, determined the disposal of waste would take place in an engineered disposal facility at Weldon Spring.

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	41,755	10,556	0	0	0	0	0	303,312

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Waste Treatment

A waste processing facility will be constructed for reducing the volume of wastes from the dismantling of buildings and structures before permanent isolation in the disposal facility. The waste processing facility is scheduled to be completed by FY 1997. In addition, a water-treatment plant will be constructed to treat contaminated liquid wastes and process water from remedial actions. The Weldon Spring site has an onsite sanitary treatment plant serviced by a septic company.

Waste Disposal

Disposal will be provided in an engineered facility. The onsite disposal facility will be a lined facility with a leachate collection system. Building waste, soil, and equipment will be placed into the disposal facility. The waste will then be entombed with a stabilized cement material produced from raffinate pit sludge. The disposal facility is designed to hold 1.2 million cubic yards of waste. Construction will be completed by FY 2003.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

Nuclear Material and Facility Stabilization activities are not anticipated to be conducted at this installation.

LANDLORD FUNCTIONS

Landlord or support functions are needed for the environmental restoration activity at the Weldon Spring site. They include analytical laboratory services; janitor and guard services; groundskeeping; maintenance and repair for administrative facilities and vehicles; design, construction, and operation of support buildings and facilities; construction and maintenance of access roads and parking areas; installation and operation of site utilities; and equipment and supplies for safe field operations.

PROGRAM MANAGEMENT

Program management provides funding for the site's project integration task including project management, administration, and implementation. Additional program management functions include environmental, safety, and health; interfaces with regulatory agencies; guidance for, and verification of, regulatory compliance; design, construction, and procurement management; cost and schedule management; and quality assurance.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Weldon Spring Site Remedial Action Project.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	20,411	7,194	0	0	0	0	0	158,438

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	41,755	10,556	0	0	0	0	0	303,312
Program Management	20,411	7,194	0	0	0	0	0	158,438
Total	62,166	17,750	0	0	0	0	0	461,750

Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restaratian		Fiscal Year
	Camplete Dismantling af Chemicol Plant Buildings	1995
	Initiate Chemical Stobilization/Solidificatian Facility Title II Design	1995
	Camplete Quorry Bulk Waste Removal	1996
	Complete Development of Soil Borrow Areo	1996
	Camplete Soil Barraw Area Haul Raod	1996
	Begin Dispasal Facility Canstructian	1997
	Begin Raffinate Pit Remediation	1998
	Camplete Removal af Building Foundotions	1998
	Begin Quarry Restaratian	1999
	Complete Ground Woter Recard af Decisian	1999
	Complete Quarry Residuols Record of Decision	1999
	Complete Vicinity Praperties Remefiotion	2000
	Complete Remediotian af Raffinote Pits	2001
	Complete Placement af Waste in Dispasal Facilities	2002
	Camplete All Environmentol Restaratian Activities	2003

For further information on this site, please contact: *Public Participation Office* *(615) 576-1590*
Public Affairs Office *(615) 576-0885*
Technical Liaison: Steve McCracken *(314) 441-8978*

MISSOURI FUSRAP SITES

The St. Louis Downtown Site, Latty Avenue Properties, St. Louis Airport, St. Louis Airport Vicinity Properties, and St. Louis Downtown Site constitute the Missouri sites within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and Atomic Energy Commission sites to reevaluate their radiological condition and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States and is funded through the Oak Ridge Operations Office. The model used to estimate costs for this Report provides one cost for all of the FUSRAP sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department of Energy (DOE) are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Missouri-FUSRAP	17,230	28,740	23,420	43,580	53,920	51,160

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 raflact EM budgat submission, costs for FY 1997-2000 reflact Budget Shortfell Scenerio, costs for shedad area assuma 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Missouri-FUSRAP	36,198	27,536	13,739	16,363	6,015	0	0	535,450

** Costs reflect e five-yeer avaraga in constant 1995 dollars, except in FY 1995 - 2000, which is a six-yaar everege.

*** Totel Life Cycle is the sum of annual costs in constant 1995 dollers.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Current 1995 Dollars)*

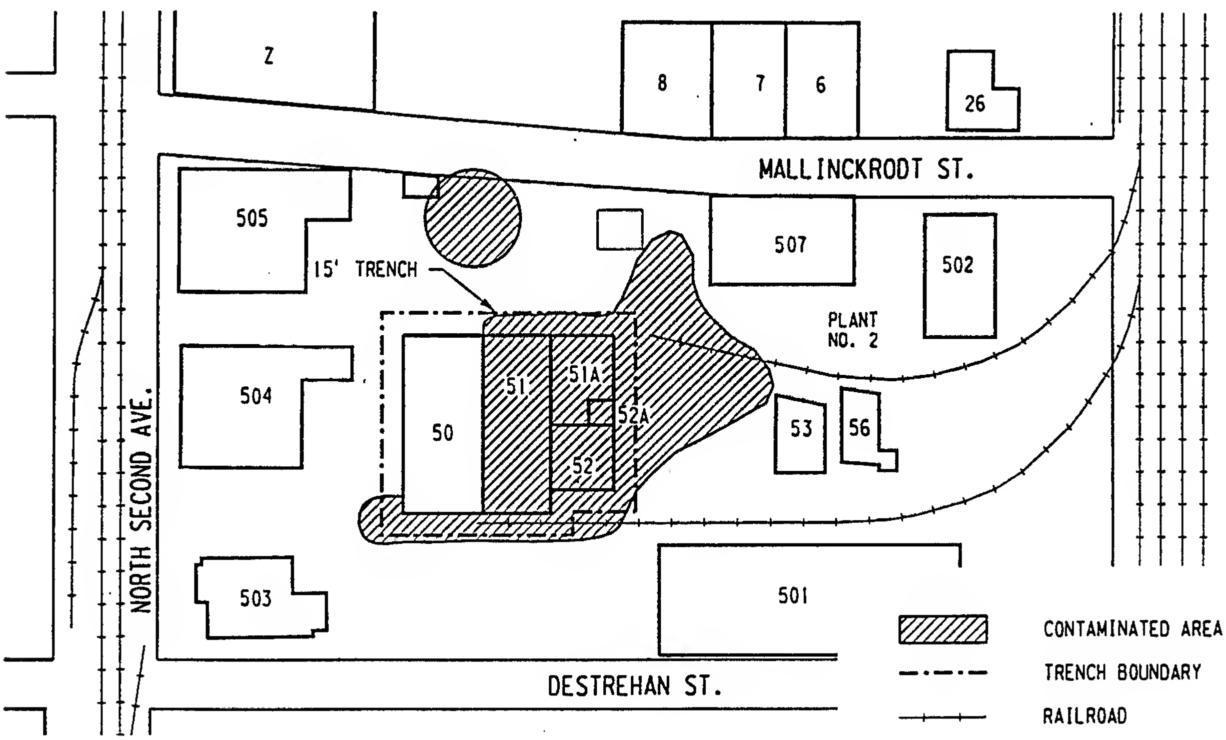
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	36,198	27,536	13,739	16,363	6,015	0	0	535,450

* Costs reflect e five-yeer average in constant 1995 dollers, except in FY 1995 - 2000, which is e six-year average.

** Totel Life Cycle is the sum of annuel costs in constent 1995 dollars.

ST. LOUIS DOWNTOWN SITE
(Formerly Utilized Sites Remedial Action Program)

The St. Louis Downtown Site is located on Mallinckrodt, Inc. property in an industrial area in the eastern part of St. Louis near the McKinley Bridge crossing of the Mississippi River. The site covers 45 acres and includes many buildings. Vicinity properties include several businesses surrounding the site.



PAST, PRESENT, AND FUTURE MISSIONS

In 1942, the Mallinckrodt Chemical Works set up an industrial scale process to recover uranium from high grade uranium ore from the Belgian Congo. Over the next 15 years, Mallinckrodt conducted a variety of uranium processing and recovery operations for the U.S. Army and the Atomic Energy Commission. By 1957, the company had processed more than 50,000 tons of natural uranium products.

The site is currently owned by Mallinckrodt. At the time of the Manhattan Engineer District and the Atomic Energy Commission operation, the sites were owned by Mallinckrodt and/or leased by Atomic Engineering Commission. During closeout of the St. Louis operations in 1957, buildings owned by the Government were either demolished or transferred to Mallinckrodt as part of a settlement. Of the 60 buildings involved in the operation within the Mallinckrodt facility, fewer than 20 buildings remain. A number of new buildings have been constructed on the site.

Future use of this site depends on resolution of the record of decision for the St. Louis sites. Options range from institutional controls/site maintenance to construction of a local disposal cell (for all four St. Louis sites) to shipment of all waste to another disposal site.

ENVIRONMENTAL RESTORATION

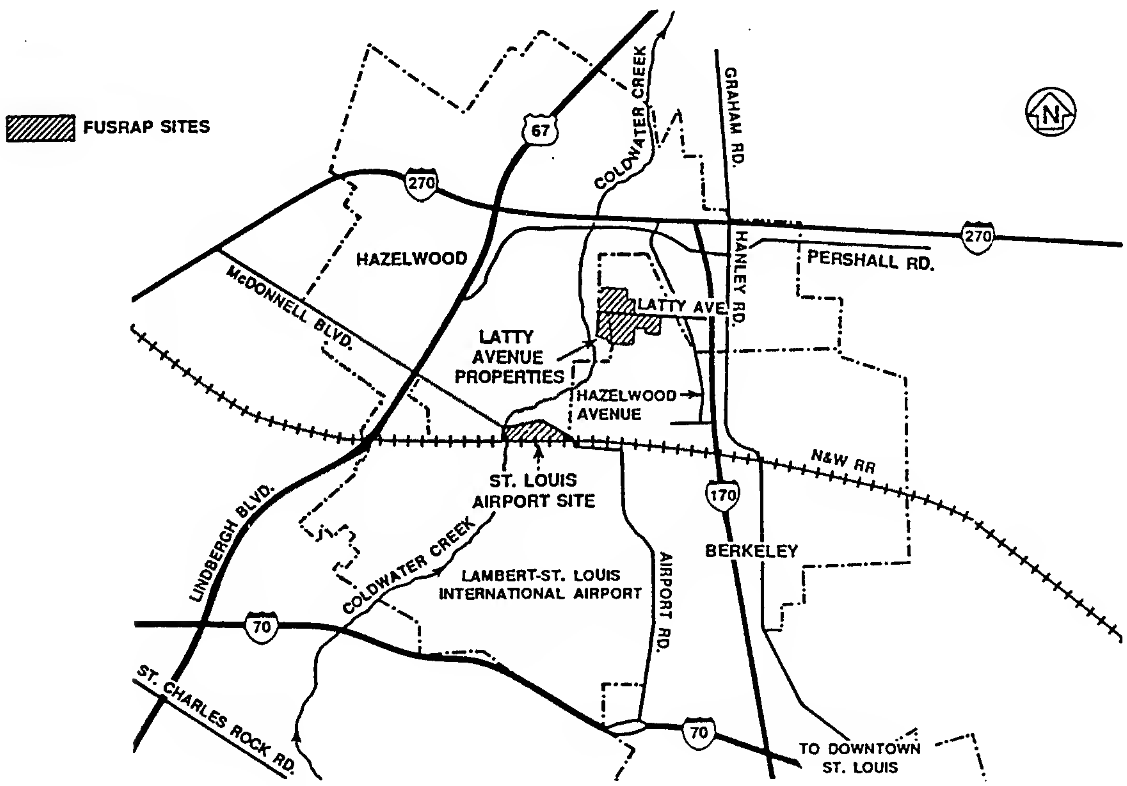
The waste volume at this site is estimated to be 246,000 cubic yards. Wastes are primarily the residues from the processing of high grade uranium ore. DOE has in the past and will in the future conduct removal actions in support of the site owners renovations and expansion activities.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

ST. LOUIS AIRPORT SITE
(Formerly Utilized Sites Remedial Action Program)

The St. Louis Airport Storage Site is a 21.7-acre tract located about 15 miles northwest of downtown St. Louis and adjacent to the northern boundary of the Lambert-St. Louis International Airport.



PAST, PRESENT, AND FUTURE MISSIONS

The site was used for the storage of residues and contaminated equipment that resulted from uranium processing activities conducted at the St. Louis Downtown Site from 1946 to 1953. No buildings exist at St. Louis Airport Site and it is surrounded by fencing. The property was owned by the U.S. Government from 1946 until 1973, when it was transferred to the City of St. Louis via Quitclaim Deed (with full disclosure of use restrictions).

Future use of this site depends on resolution of the record of decision for the St. Louis sites. Options range from institutional controls/site maintenance, to construction of a local disposal cell (for all four St. Louis sites), to shipment of all wastes to another disposal site.

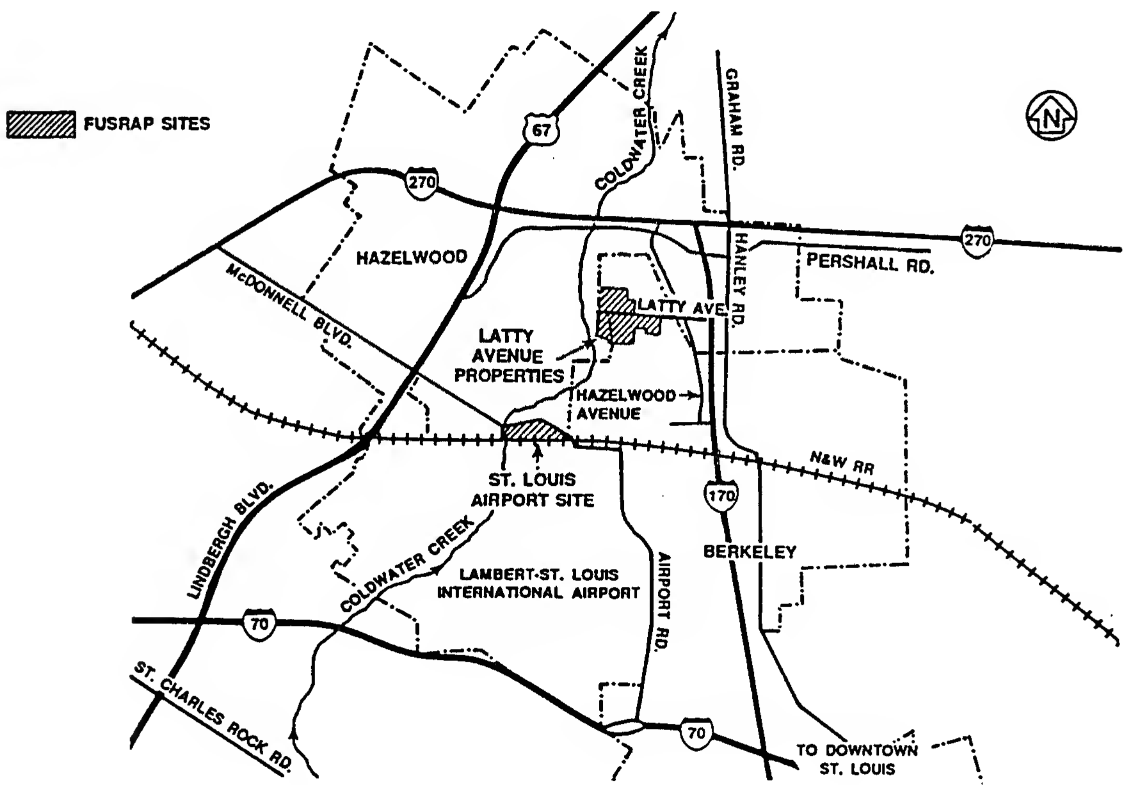
ENVIRONMENTAL RESTORATION

This site is on the Environmental Protection Agency's National Priorities List. Most of the concentrated residues were sold and removed from the site in 1966 and 1967. Onsite structures were razed, buried on the site, and covered with 1 to 3 feet of clean fill. Buried deposits of uranium, radium, and thorium remain on the site. The waste volume at the St. Louis Airport Site is estimated to be 250,000 cubic yards. Wastes are primarily the residues from the processing of high-grade uranium ore.

For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*

ST. LOUIS AIRPORT SITE VICINITY PROPERTIES (Formerly Utilized Sites Remedial Action Program)

The St. Louis Airport Storage Site Vicinity Properties consist of 78 properties along transportation routes, the Norfolk and Western Railroad, the ball field, and Coldwater Creek, which flows 500 feet along the western border of St. Louis Airport Site and then for 1,000 feet adjacent to the Latty Avenue Site. The vicinity properties are located in the Cities of Hazelwood and Berkeley, Missouri.



PAST, PRESENT, AND FUTURE MISSIONS

These properties were primarily contaminated by materials from the St. Louis Airport Site and its associated activities. Future use of this site depends on resolution of the record of decision for the St. Louis sites. Options range from institutional controls/site maintenance, to construction of a waste disposal cell (for all four St. Louis sites), to shipment of all waste to another disposal site.

ENVIRONMENTAL RESTORATION

The waste volume at these vicinity properties is estimated to be 90,000 cubic yards. Wastes are primarily soils and sediment containing residues from the processing of high-grade uranium ore that migrated from the St. Louis Airport Site or the Latty Avenue Site via environmental forces or during hauling operations between the two sites.

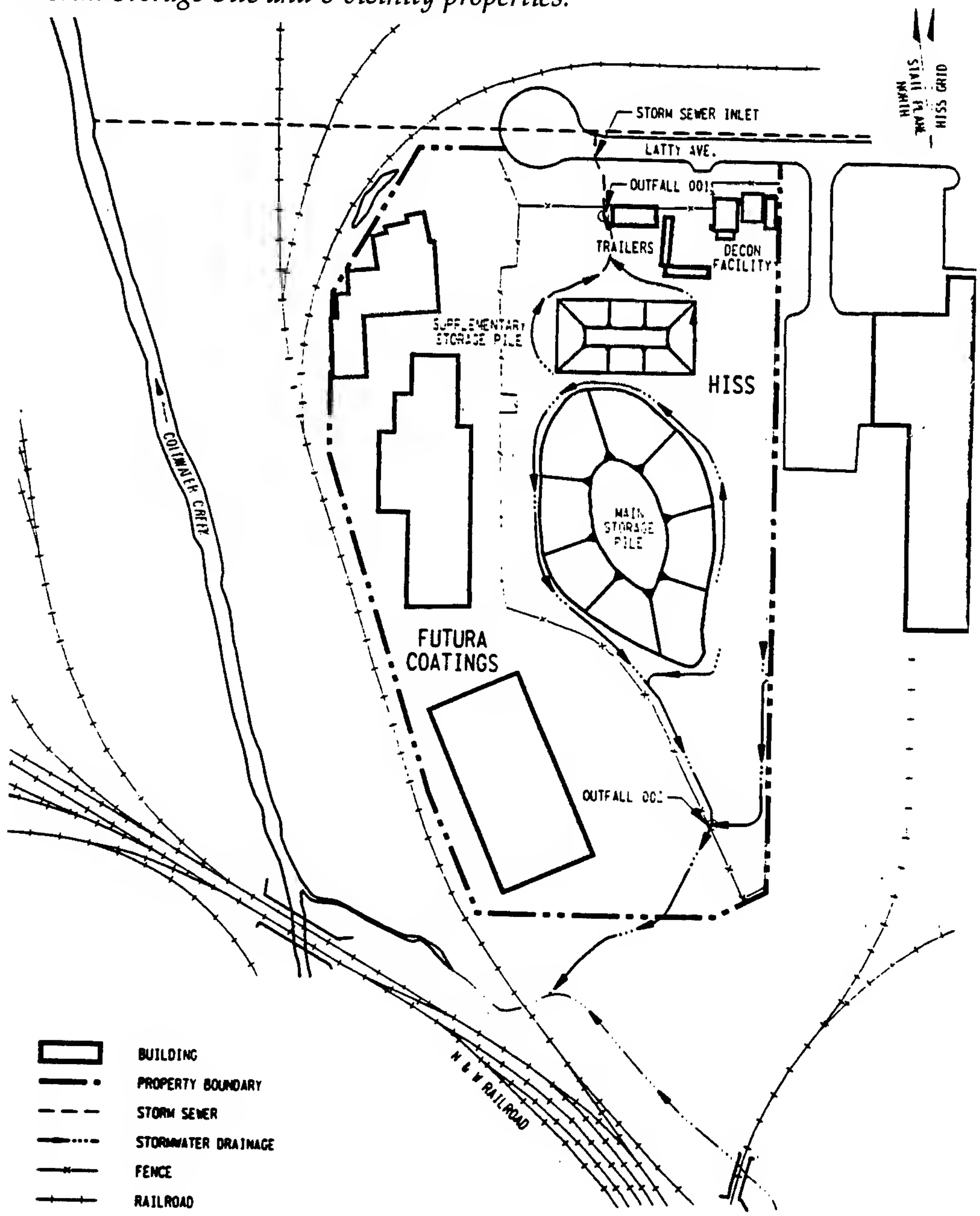
In FY 1995, approximately 1,400 cubic yards of waste was removed from these properties and shipped to Envirocare, Inc. in Utah for disposal.

For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*

LATTY AVENUE PROPERTIES
(Formerly Utilized Sites Remedial Action Program)

The Latty Avenue Properties Site is located at 9200 Latty Avenue, Hazelwood, Missouri, in a heavily industrialized area approximately 1 kilometer (0.75 miles) north of the St. Louis Airport. There are three buildings on the site and the Hazelwood Interim Storage Site.

The Hazelwood Interim Storage Site and the adjacent Futura Coating properties (three buildings) are on the Environmental Protection Agency's National Priorities List. The 12-acre site includes the Hazelwood Interim Storage Site and 6 vicinity properties.



PAST, PRESENT, AND FUTURE MISSIONS

The waste originated as processing residue from uranium production at the St. Louis Downtown plant from 1942 through the late 1950's. The waste was transported to the nearby St. Louis Airport Site for storage and then was purchased by the Commercial Discount Corporation of Chicago in 1967 and transported to the Latty Avenue Site. This material was sold to the Cotter Corporation in 1969 and was dried and shipped to their facilities in Canon City, Colorado. Before the present owner (Futura Coating Company) occupied the site, a radiological characterization revealed thorium and radium contamination in excess of Department of Energy (DOE) guidelines in and around the buildings and in the soil. Congress authorized DOE to cleanup the site in 1983.

The waste is primarily soil containing low-level waste residues resulting from the processing of high-grade uranium ore. Future use of this site depends on resolution of the record of decision for the St. Louis sites. Options range from employing long-term institutional controls, to construction of a local disposal cell (for all four St. Louis FUSRAP sites), to shipment of all waste to another disposal site.

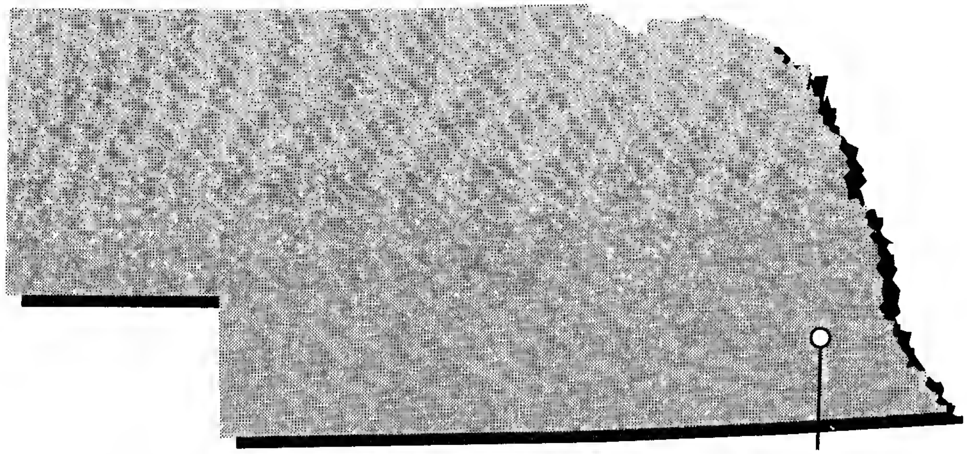
ENVIRONMENTAL RESTORATION

Residues from the cleanup of some of these properties has been placed on two covered onsite storage piles. The larger waste pile is approximately 100 meters long, 60 meters wide, and 9 meters high. The smaller pile is approximately 60 meters long, 25 meters wide, and 5 meters high. The waste volume for the site, including both piles, and belowgrade waste onsite and from the vicinity properties is estimated to be 211,000 cubic yards.

Remedial actions have included clearing the site and surveying adjacent properties; constructing a decontamination facility and installing a perimeter fence; excavating and backfilling the shoulders of Latty Ave. and covering the contaminated soils; surveying services; material testing; and monitoring well installation. Remediation is anticipated to be complete by FY 2009.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*



* Ongoing surveillance and monitoring costs are provided in the table below.

NEBRASKA

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Hallam	21	22	22	23	23	25

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

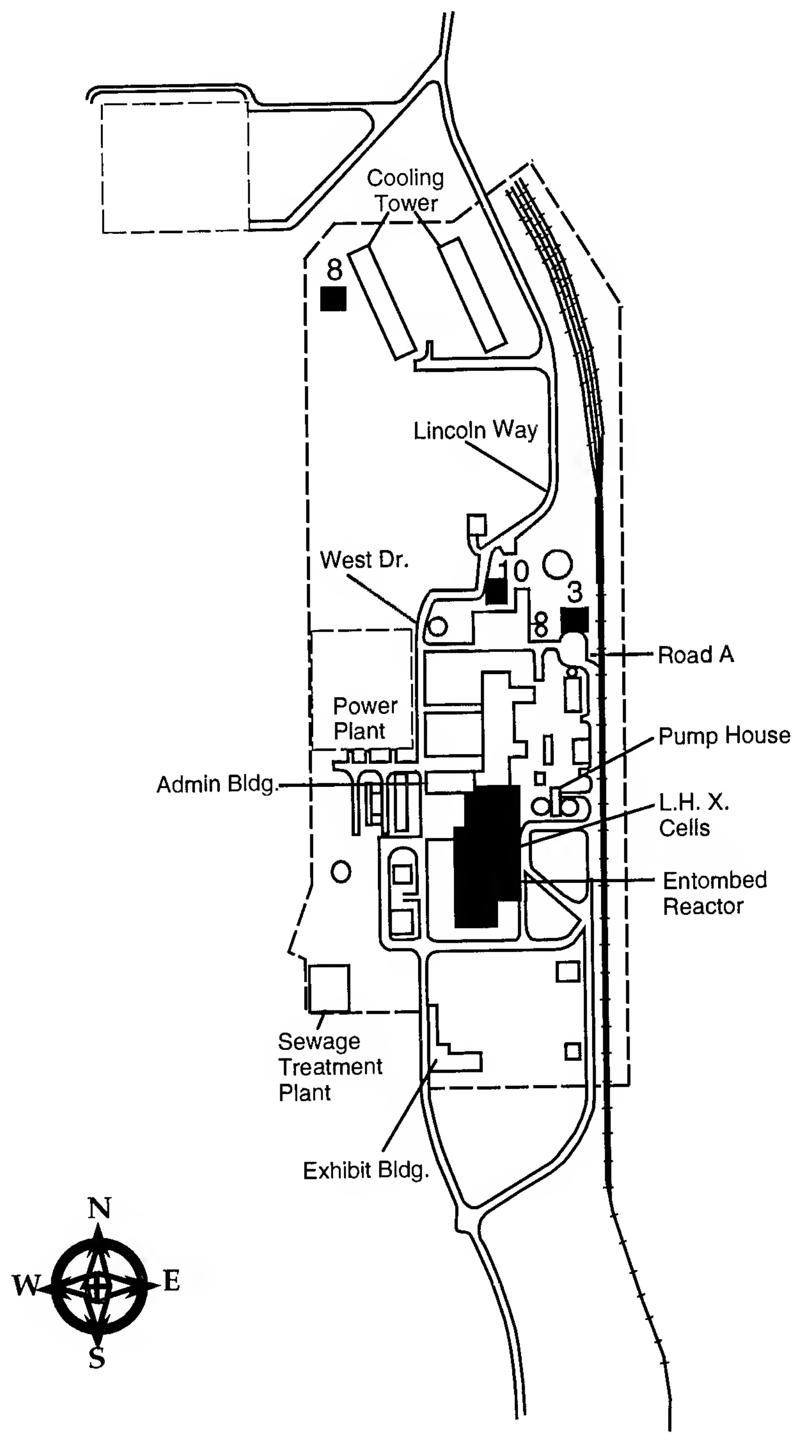
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Hallam	21	27	0	0	0	0	0	261

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Totel Life Cycle is the sum of annual costs in constant 1995 dollars.*

HALLAM NUCLEAR POWER FACILITY

The Hallam Nuclear Power Facility is located in Hallam, Nebraska. Activities at the site are managed through the Department of Energy Chicago Operations Office.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmentol Restorotion	21	22	22	23	23	25

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmentol Restorotion	21	27	0	0	0	0	0	261

** Costs reflect a five-year average in constent 1995 dollers, except in FY 1995 - 2000, which is e six-yeer average.

*** Totel Life Cycle is the sum of ennual costs in constent 1995 dollers.

PAST, PRESENT, AND FUTURE MISSIONS

The Hallam Nuclear Power Facility was a 240 megawatt (thermal) sodium-cooled graphite-moderated nuclear reactor built and operated as a demonstration project by the Atomic Energy Commission between 1962 and 1964. In 1965, the Atomic Energy Commission terminated its agreement with Consumers Public Power District for operation of the facility, and in 1967, Nebraska Public Power District (formerly Consumers Public Power District) was authorized to decommission and dismantle the facility. This activity ended in 1969, and the facility was retired by the Atomic Energy Commission in 1971. As a successor agency to the Atomic Energy Commission, DOE now has responsibility for the buildings at the Hallam Nuclear Power Facility.

Hallam Nuclear Power Facility has no current mission. Activities at the site are limited to semi-annual surveillance and maintenance, which is expected to end in FY 2005.

It is assumed the buildings comprising the Hallam Nuclear Power Facility will be returned to Nebraska Public Power District in 2005. Future use of the facility is assumed to remain restricted.

ENVIRONMENTAL RESTORATION

There is no known environmental contamination at the site. Potential contaminants include nickel-63, cobalt-60, iron-55, manganese-54, samarium-151, cesium-137, strontium-90, and tritium; however, all such materials are contained within the entombment structure in Area 1 (reactor vessel and vessel containment structures), Area 2 (fuel storage pit 3 thimbles), or Area 3 (moderator element storage cells). The contaminants within the

structure consist of activation products in the stainless steel reactor vessel and its internals. Lesser amounts of activation products are dispersed in the carbon steel thermal shield and guard vessel surrounding the reactor vessel and in the compartment liner itself.

At the time the reactor was decommissioned and dismantled, the reactor and most of the radioactive materials were removed from the site. All bulk sodium was removed from the site, and residual sodium was reacted with steam to form sodium hydroxide, removing the potential for hydrogen formation at a later date should water leak into the facility. Remaining within the compartment are the reactor vessel and surrounding guard vessel, with associated double-walled piping and most of the reactor vessel internals.

Fuel Storage Pit 3 contains a number of stainless steel thimbles formerly used to store spent fuel elements. The storage pool was drained, and the thimbles now contain process tubes, control rod tubes, dummy elements, and a spent neutron source. To assure leak tightness, closures and dust covers for each thimble have been welded in place and the interspace has been filled with expanding concrete. Storage Area 3 consists of 12 moderator-element storage cells containing 3 canistered moderator elements that experienced cladding failures during reactor operation. A number of parts, such as pumps, valves, and segments of piping are stored in these cells. The moderator cells were sealed by welding the plug casings to the cell liners and filling the space above the plugs with expanding concrete. The basement level of the facility contained radioactive waste disposal equipment, which has been either removed or decontaminated, as appropriate. All reactor compartments have been sealed, and the surface of the below-grade concrete structure was covered with sand, a waterproof polyvinyl membrane, and a covering of earth. The cover was sloped for proper drainage, and drain tile was installed at the periphery. Above-grade structures have been weatherproofed by a layer of polyvinyl sheet and a protective cover of concrete.

Current environmental restoration activities include continued semiannual surveillance and monitoring, and characterization of a reported perched ground-water system in the vicinity of the Hallam Nuclear Power Facility. Surveillance and monitoring includes radiological sampling and analysis, and continuous monitoring of perched ground-water levels in two piezometers at the site. No further action is planned at this time.

WASTE MANAGEMENT ACTIVITIES

There are no current or planned waste management activities at the Hallam Nuclear Power Facility site.

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Long Term Surveillance and Monitoring	21	27	0	0	0	0	0	261

**Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

***Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned facility stabilization, maintenance, or monitoring activities at the Hallam Nuclear Power Facility.

LANDLORD FUNCTIONS

At the present time, landlord activities at Hallam Nuclear Power Facility are the responsibility of the land owner, the Nebraska Public Power District.

PROGRAM MANAGEMENT

Program management at Hallam Nuclear Power Facility is concerned with management of the semiannual surveillance and monitoring activities, and review and analysis of the data. These activities are performed by Chicago Operations Office personnel on a level-of-effort basis.

FUNDING AND COST INFORMATION

The following tables present current and projected funding information and major Environmental Management program activity and project costs projected through completion for the Hallam Nuclear Power Facility.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	21	27	0	0	0	0	0	261

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

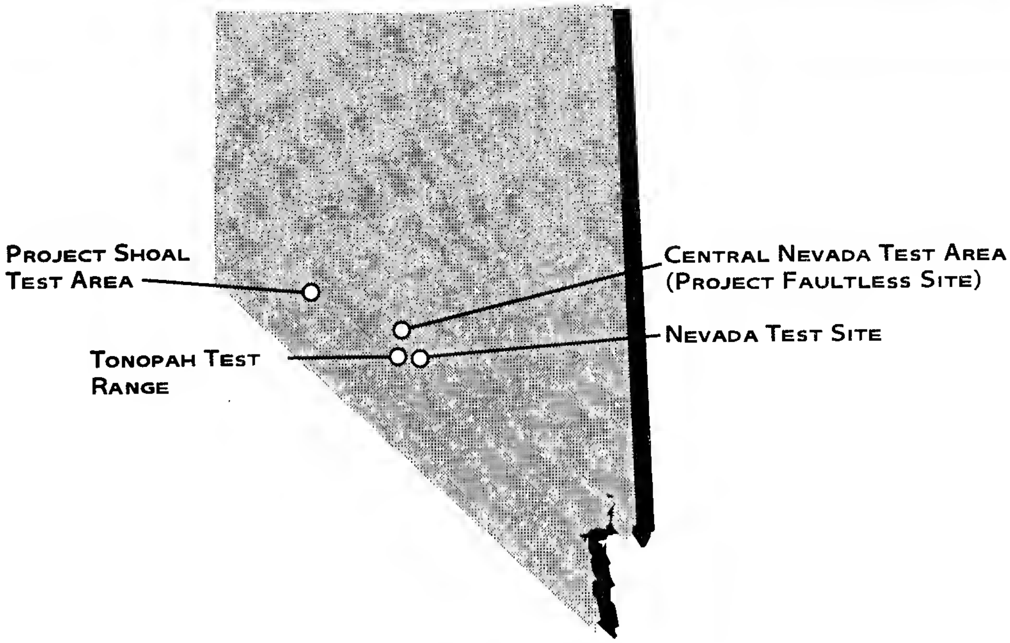
*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmentol Restoration		Fiscal Yeor
	Submit Finol Annuol Report at conclusion of monitoring	FY 2005
	Environmentol restoration octivities completed	FY 2005

For further information on this site, please contact:

Public Participation Office		*(708) 252-8796*
Public Affairs Office		*(708) 252-2010*
Technical Liaison:	*Michael Ferrigan*	*(708) 252-2570*



NEVADA

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Nevada Test Site	67,487	93,244	101,404	106,320	99,911	110,718
Central Nevada/Tonopah/Shoal Test Site	950	2,937	3,424	2,607	1,249	762
Total - Nevada	68,437	96,181	104,828	108,927	101,160	111,480

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assuma 3% ennual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Nevada Test Site	89,195	153,876	162,722	124,447	50,569	29,806	26,965
Central Nevada/Tonopah/Shoal Test Site	1,840	550	80	100	50	130	120
Total - Nevada	91,035	154,426	162,802	124,547	50,619	29,936	27,085

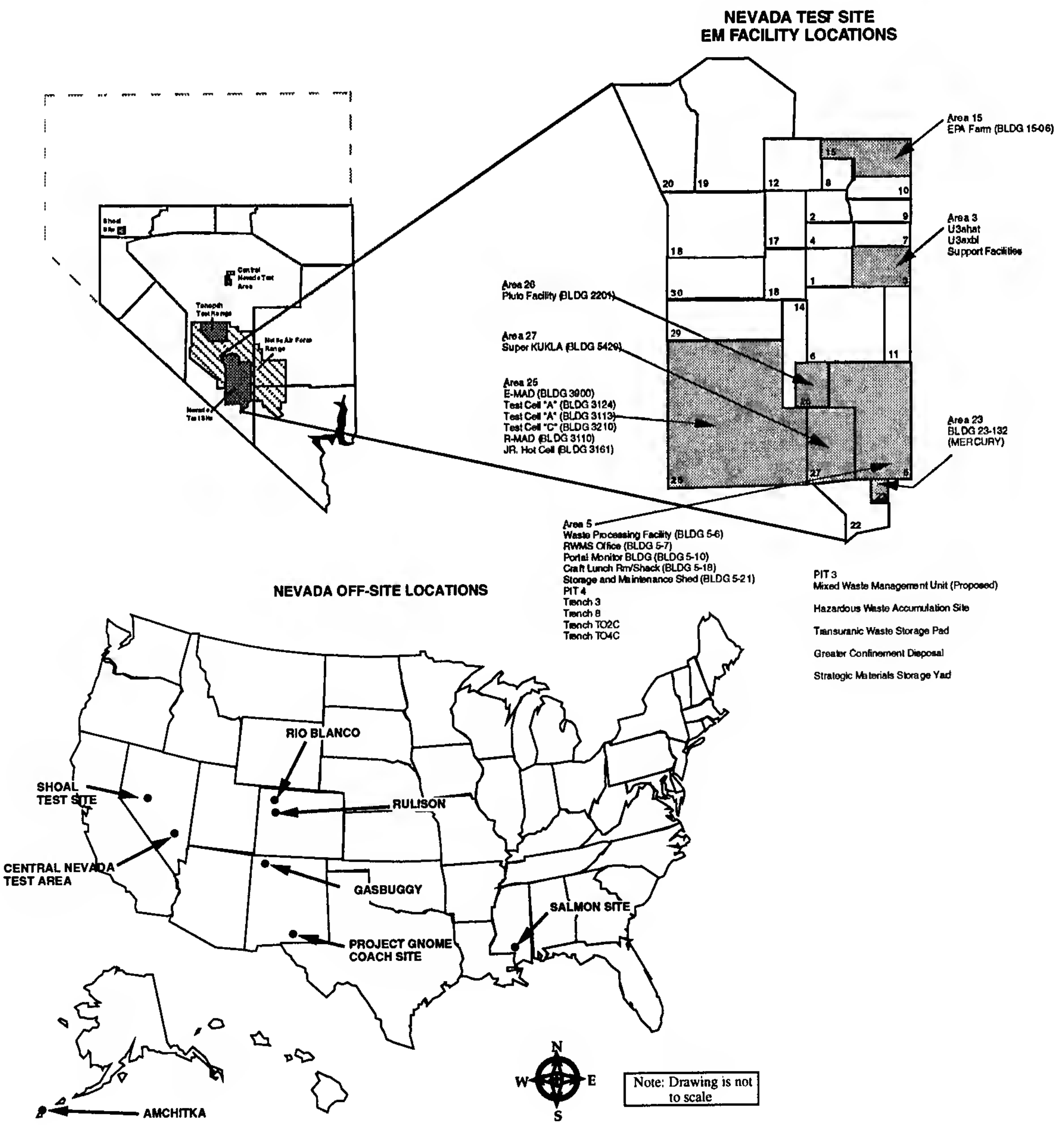
	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Nevada Test Site	15,035	9,408	4,106	3,327	2,317	465	0	3,450,388
Central Nevada/Tonopah/Shoal Test Site	100	52	32	22	4	0	0	17,240
Total - Nevada	15,135	9,460	4,138	3,349	2,321	465	0	3,467,628

** *Costs reflect a five-yeer evarege in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Totel Life Cycle is the sum of ennuel costs in constent 1995 dollars.*

NEVADA TEST SITE

Currently, the Nevada Operations Office manages sites in 10 locations and retains responsibility for previous testing activity by the Department of Energy (DOE) and its predecessors. The largest of these locations is the multifunctional Nevada Test Site, a 1,350-square-mile Federal reservation situated about 65 miles northwest of Las Vegas. The Nevada Test Site contains the Town of Mercury, which provides temporary residence for some of the work force. Other principal Departmental sites are the North Las Vegas complex in North Las Vegas Nevada and the Remote Sensing Lab complex on Nellis Air Force Base, Nevada. The locations of past testing off the Nevada Test Site include the Central Nevada Test Area, the Tonopah Test Range, and the Shoal Event Site in Nevada; the Amchitka Island Site in Alaska; the Rio Blanco and Rulison Gas simulation Test Sites in Colorado; the Gasbuggy and Gnome–Coach Test Sites in New Mexico; and the Salmon Test Site in Mississippi. The Nevada Offsite locations are depicted on the Nevada Offsite Locations map.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	31,784	47,109	50,570	51,134	52,039	57,505
Waste Management	21,098	30,159	34,298	38,221	30,472	35,402
Nuclear Material and Facility Stabilization	0	138	140	143	146	150
Program Management	14,605	15,838	16,396	16,822	17,254	17,661
Total	67,487	93,244	101,404	106,320	99,911	110,718

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	44,637	65,644	83,570	83,078	18,344	900	1,345
Waste Management	29,216	32,706	32,940	29,662	26,418	24,515	21,879
Nuclear Material And Facility Stabilization	109	40,935	34,581	1,635	0	0	0
Program Management	15,233	14,591	11,631	10,071	5,817	4,391	3,740
Total	89,195	153,876	162,722	124,447	50,569	29,806	26,965

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	1,172	1,712	1,260	910	0	0	0	1,557,449
Waste Management	11,839	6,573	2,431	2,064	1,979	397	0	1,142,309
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	386,413
Program Management	2,024	1,124	416	353	338	68	0	364,216
Total	15,035	9,408	4,106	3,327	2,317	465	0	3,450,388

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

For over 40 years, the primary mission of the DOE's Nevada Operations Office was to conduct field testing of both nuclear and conventional explosives in connection with the research and development of nuclear weapons. The Nevada Test Site was established in 1950 when President Truman authorized a continental weapons testing area at the Las Vegas Bombing and Gunnery Range. Since January 1951, the primary mission of the Nevada Test Site has been testing nuclear weapons.

In addition to weapons tests, the site has also hosted secondary missions, including the following: neutron and gamma–ray interaction studies; open–air nuclear reactor, nuclear engine, and nuclear furnace tests; hazardous materials spill response testing; and experiments involving radioactive and nonradioactive materials conducted by the Department of Defense. In the 1950's, above-ground atmospheric tests were the predominate site activity. Above-ground testing of nuclear weapons ceased in 1963, and the offsite tests ended in 1973. Since October 1992, the Nevada Operations Office has suspended subsurface nuclear testing as well, but it maintains a readiness posture to resume if deemed necessary by the President.

At present, the Nevada Test Site is one of the primary low-level waste disposal sites for the Department of Energy complex. It is assumed this role will continue in support of the Environmental Management program.

Use of the Nevada Test Site and other Nevada Operations Office resources for technology initiatives will increase significantly in the future. The Nevada Test Site will remain under DOE ownership and institutional control until new directions in mission and land use are determined. The Nevada Operations Office is undergoing significant changes to be compatible with the future strategic plans of the Department. In general, the Nevada Operations Office intends to develop and/or enhance capabilities for remote field operations in connection with nuclear requirements; for management of special nuclear materials; for environmental stewardship of facilities; for nonnuclear research and experimentation; and for technology transfer through partnership with private industry, national laboratories, and other Federal, State, and local entities.

ENVIRONMENTAL RESTORATION

There are approximately 2,000 potential areas requiring some level of investigation and possible remediation at the Nevada Test Site. Approximately 1,030 of these areas are related to the underground testing of nuclear weapons; more than 100 resulted from aboveground testing. The remaining areas include waste disposal facilities, leachfields, landfills, storage tanks, injection wells, inactive and abandoned buildings, associated equipment contaminated by prior operations, spill areas, and hundreds of small sites where unregulated disposal or storage of waste materials occurred during operations.

Beyond the Nevada Test Site, DOE has conducted nuclear testing activities at nine locations in five States. Amchitka Island was the site of three underground nuclear detonations for seismic studies, calibration, and warhead development. Two nuclear

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Industrial Sites and Facilities	13,009	35,968	62,362	60,898	18,094	720	1,225
Plutonium Contaminated Soils	9,170	19,916	21,138	22,140	200	150	100
Underground Test Areas	22,458	9,760	70	40	40	30	20
Total	44,637	65,644	83,570	83,078	18,334	900	1,345

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Industrial Sites and Facilities	1,172	1,712	1,260	910	0	0	0	999,656
Plutonium Contaminated Soils	0	0	0	0	0	0	0	373,241
Underground Test Areas	0	0	0	0	0	0	0	184,551
Total	1,172	1,712	1,260	910	0	0	0	1,557,449

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

detonations were conducted in drilled wells to test enhancement of gas production in tight sands at two sites near Rifle, Colorado, as part of the Plowshare Program which explored peacetime uses for nuclear explosives. As part of seismic coupling studies, two nuclear and two nonnuclear detonations were conducted in a shared cavity in the Tatum Salt Dome near Hattiesburg, Mississippi. Nuclear detonations were conducted in bedded salt deposits near Carlsbad, New Mexico, and in sandstone near Farmington, New Mexico, to determine whether a nuclear explosion could stimulate the release of natural gas. Both experiments were part of the Plowshare Program. Finally, nuclear explosive tests were conducted near Fallon, Nevada, at the Tonopah Test Range, and at the Central Nevada Test Area. The test at Fallon was conducted to improve the ability to detect and identify underground nuclear explosions; tests at the Tonopah Test Range were conducted to evaluate delivery systems; and the nonnuclear special experiments at the Central Nevada Test Area was conducted to determine the behavior of seismic waves. Contaminants resulting from these tests include organic compounds; radionuclides; metals such as beryllium; lead; hydrocarbons; drilling mud; and residues from plastics, epoxy, and drilling instrumentation.

Specific assumptions under Future Mission address land use planning for the Nevada Test Site and for the offsites. A formal land use plan for the Nevada Test Site has been delayed because both the Site Wide Environmental Impact Statement and a Strategic Planning Initiative to determine future uses of the Nevada Test Site are underway. Formal land use plans for the offsite locations are not anticipated in the foreseeable future. Formal risk assessments will also be conducted. As these activities are completed, the information will be reflected in annual updates of the Baseline Environmental Management Report.

Because the Nevada environmental restoration projects are still in the early stages of characterization, the remedial strategies have not been fully developed. As the technologies are developed further, remedial strategies will be updated and will be reflected in future Baseline Environmental Management Reports. Because of these uncertainties, definitive cost projections are not available. Treatment and storage costs for the wastes generated during the assessment and remediation phases of the project are included within the scope of environmental restoration funding.

To determine the expected costs and waste volumes for the potential release sites not yet characterized, parametric modeling was used. In some areas where parametric estimating data was lacking, assumptions were generated by providing bounding conditions that allow an estimate to be generated. In some instances, site size and known conditions were used to estimate contaminated volumes.

Estimates generated for this document did not include active sites and sites not transitioned to the Environmental Management (EM) program. Such sites include, but are not limited to, nuclear device and nuclear engine tests sites, nuclear shots in the Pacific (including Bikini Atoll), the Liquified Gaseous Fuels Test Facility, and contaminated sites remaining under Department of Defense funding. (Projected transfers are addressed in Nuclear Materials and Facility Stabilization projects.)

To facilitate the estimating process, two assumptions have been made. The first is that activated metals are considered a source and are estimated in the mediums of rubble/debris and low-level radioactive waste. The second is radon is not considered to be a significant source because it is controlled by ventilation in the tunnels and it exists at near-background levels for surface-based activities.

Each site or facility has not been specifically identified by name in this document because there are over 2,000 sites. For this reason, most

sites are simply identified as Nevada Environmental Restoration Program Sites. Only those sites identified in the Nevada Environmental Restoration Program Work Breakdown Structure have been specified by name.

Industrial Sites and Facilities

The Industrial Sites and Facilities activity is comprised of several subprojects that include:

- Source Groupings-Assessment and Remediation
- Resource Conservation and Recovery Act (RCRA) Closures - Assessment and Remediation
- Environmental Restoration Sites Inventory
- Postclosure Care, and
- Decommissioning Activities Facility Assessment and Remediation.

These subprojects will be conducted under RCRA until regulatory uncertainties are clarified in a regulatory agreement with the State of Nevada. Identified plans and activities that require revision, modification, or redefinition will be implemented in consultation with the cognizant regulatory authority.

The Source Groupings subproject includes the assessment and remediation of "like" waste units: tunnel muck piles, tunnel ponds, sumps and injection wells, inactive tanks, leachfields, contaminated waste sites, atmospheric test debris, and miscellaneous other sites. The subject waste units are the result or byproduct of testing and support activities in the past at the Nevada Test Site.

The RCRA Closures subproject provides for closure of several industrial sites that were named in the RCRA Part B Permit Application. These Waste Units were generally in use more recently than Source Groupings Waste Units. Included in this activity are the development and implementation of characterization plans and closure plans following State of Nevada approval, and management of wastes generated by characterization and closure activities.

Characterization of these sites will be accomplished in three phases. The first generally consists of researching process knowledge, planning the field effort, development of Data Quality Objectives and, if necessary, gathering preliminary data. The second phase employs more intrusive techniques, such as drilling, to determine whether contaminants have migrated. A last phase, if needed, is employed to define more fully the vertical and lateral extent of contamination.

When characterization is complete, closure plans will be developed. Closure may be in the form of (1) "clean closure," i.e., excavation or removal of all contamination, and/or remediation of the media to achieve predetermined cleanup levels, or (2) closure in place, leaving the waste in place, usually stabilized, solidified, or covered with an engineered cap. Some closures may be achieved through a combination of removal/ remediation and closure in place. In some cases, no action may be appropriate. Closure using the Streamlined Approach for Environmental Restoration will be implemented when appropriate.

The Environmental Restoration Sites Inventory subproject provides for conducting an inventory of all known Departmental environmental restoration sites to determine restoration responsibilities and identify new sites. The inventory will include validation of information through photographic monitoring and through field verification including surveying using global positioning system techniques. New sites may be identified through review of archived literature, photographs, and site visits. An established database that compiles all the information on each site will be maintained. Existing and

newly identified sites will be assigned to Project Data Sheets as information about planned disposition for each site is determined. The inventory fulfills the Nevada Test Site RCRA Part B applicable requirement to list solid waste management units.

The Postclosure Care subproject consists of monitoring activities that must take place to comply with RCRA Postclosure Care Permit Applications submitted to the State of Nevada. The activities consist of collecting periodic measurements and/or samples from monitoring wells, effluent streams, etc., as stipulated in each unit's Postclosure Care Permit. Condition inspection and maintenance of any remedial systems such as caps or active systems is included as applicable. Sample analysis and preparation of a report for each monitoring period is included as well.

The Decommissioning Activities subproject involves assessment and remediation of facilities that have no planned future use and which are or may be contaminated from Departmental mission-related activities. Assessment tasks include characterization and design activities. A site-specific work plan for the characterization effort will be prepared, and permits will be obtained for assessment, including a National Environmental Policy Act (NEPA) determination, in addition to endangered species clearance. Surveys to comply with the Historic Preservation Act of 1966 will be completed.

Facility characterization will be conducted at eight multistructure facilities currently included in the decommissioning activities at the Nevada Test Site. Characterization includes periodic surveillance and maintenance before decommissioning takes place (to document building deterioration), characterization planning, sample collection and analysis, data management, data evaluation, risk/dose assessment, and assessment report preparation. The Facility Assessment Report will document and discuss the nature and extent of contamination present in each facility, release criteria calculations, the risk/dose assessment, and findings. A design will be prepared which specifies the construction/demolition activities necessary for remediation. Remediation for decommissioning purposes will be conducted after completion of design activities. Remediation activities may include one or more of the following: dismantlement, demolition, encapsulation, entombment, or other operations to achieve the designated disposition alternative for each facility.

Remediation activities will include decommissioning options, which will include one or more of the following: dismantlement, demolition, encapsulation, entombment, or other operations to achieve the designated disposition alternative for each facility.

Plutonium Contaminated Soils

This activity provides for a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Investigation/Feasibility Study and remediation of contaminated surface soils on the Nevada Test Site, Tonopah Test Range, and Nellis Air Force Range. This includes Area 13, where contamination is the result of weapons testing activities. Activities will proceed as CERCLA actions until uncertainties are clarified in a regulatory agreement with the State of Nevada. Included in this activity is the work initiated as part of the Technology Development Integrated Demonstration Program, now identified as Treatability Studies for Soils Media.

Safety tests at the sites have resulted in plutonium contamination of surficial soils over large areas. Historic sampling and testing at the safety test locations have shown that at least 3,200 acres of soils are contaminated with plutonium at levels in excess of 40 picocuries per gram. When including atmospheric tests,

the acreage contaminated in excess of 40 picocuries per gram increases to approximately 27,000 acres on the locations listed above.

The Remedial Investigation/Feasibility Study will focus on determining the potential risk associated with resuspension of plutonium contaminated soils at the Nevada Test Site, the Tonopah Test Range, and the Nellis Air Force Range, as well as areas with mixed fission products, primarily from atmospheric or shallow cratering events. The Remedial Investigation/Feasibility Study work will characterize the sites and will identify and evaluate the applicable, relevant, and appropriate regulations to guide remediation. Performing a Remedial Investigation/ Feasibility Study at the Tonopah Test Range and Nellis Air Force Range is complicated by a number of logistical and technical factors. Use of the areas for other Nevada Operations Office operations and/or Department of Defense operations may constrain access to the site for field investigations.

To overcome some of the technical difficulties associated with completing the Remedial Investigation/Feasibility Study, development and testing of new analytical and remedial technologies are currently underway. Progress is occurring in research, development, testing, and evaluation of technologies for the collection (excavation) of soils and in the physical separation of plutonium, americium, uranium, and other transuranics from the soils.

One or more Interim Removal Actions will be implemented using the streamlined approach for environmental restoration. The first such activity will be at the Double Tracks site on the Nellis Air Force Range, just west of the Tonopah Test Range. Other actions may be implemented on sites at the Tonopah Test Range in an effort to clean up the Tonopah Test Range before remediation of the Nevada Test Site. Disposal of contaminated soil resulting from these actions will likely require permitting and constructing a Uranium Mill Tailings Remedial Action Project–type facility at the Tonopah Test Range, or alternatively, transporting soils across the Nellis Air Force Range for disposal in craters on the Nevada Test Site. This transportation will require some new road construction. The cost difference for either option is not believed to be the determining factor.

Underground Test Areas

The Underground Test Area Operable Unit activity provides for CERCLA Remedial Investigation/Feasibility Study activities and for monitoring at the Nevada Test Site. Activities will proceed as CERCLA actions until uncertainties are clarified in a regulatory agreement with the State of Nevada.

Two phases are incorporated into performing the Underground Test Area Remedial Investigation/Feasibility Study. Phase I represents an initial Remedial Investigation/ Feasibility Study consisting of both data analysis and data collection activities. Phase II is predicated on a decision analysis strategy to objectively evaluate reasonable remedial alternatives for the Underground Test Area Operable Unit.

Phase I activities include assessment activities and field activities. Assessment activities include the evaluation of existing data; modeling of regional ground water flow and solute transport; and a preliminary risk assessment. Field activities will provide an evaluation of drilling and data collection techniques, and they will involve the collection of new characterization data. The Phase I effort is expected to last through FY 1996. Regional modeling and baseline risk assessments are currently ongoing as part of Phase I and will be modified to include near field modeling results for input into the decision analysis. The decision analysis model will incorporate probabilistic uncertainties from the regional and near-field ground-water flow and solute transport modeling results; preliminary risk

assessment; future land use; stakeholder/regulatory concerns; and the results of the Focused Feasibility Study.

The Phase II work scope is focused on developing a decision analysis model for selecting a remedial alternative, coupled with the design and installation of a compliance monitoring network. The decision analysis results will provide probabilities pertaining to cost and implementation and to other criteria affecting potential technically feasible remedial actions. These results in turn will be incorporated into a focused feasibility study. The focused feasibility study will screen and evaluate potential interim remedial actions to identify an interim remedy. Phase II field activities will include installing monitoring wells in locations specified by modeling results

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Industrial Sites and Facilities							
Assessment	4,319	2,684	3,084	0	0	0	0
Remedial Actions	8,690	33,175	59,030	60,784	17,900	0	0
Surveillance And Maintenance	0	0	0	114	194	720	1,225
Facility Decommissioning	0	109	248	0	0	0	0
Plutonium Contaminated Soils							
Assessment	2,530	2,200	2,450	5,000	0	0	0
Remedial Actions	6,640	17,716	18,688	17,140	200	150	100
Underground Test Areas							
Assessment	6,999	0	0	0	0	0	0
Remedial Actions	15,459	9,660	0	0	0	0	0
Surveillance And Maintenance	0	100	70	40	40	30	20
Total	44,637	65,644	83,570	83,078	18,334	900	1,345

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Industrial Sites and Facilities								
Assessment	0	0	0	0	0	0	0	54,752
Remedial Actions	0	0	0	0	0	0	0	906,583
Surveillance And Maintenance	1,172	1,712	1,260	910	0	0	0	36,537
Facility Decommissioning	0	0	0	0	0	0	0	1,784
Plutonium Contaminated Soils								
Assessment	0	0	0	0	0	0	0	63,432
Remedial Actions	0	0	0	0	0	0	0	309,809
Underground Test Areas								
Assessment	0	0	0	0	0	0	0	41,996
Remedial Actions	0	0	0	0	0	0	0	141,055
Surveillance And Maintenance	0	0	0	0	0	0	0	1,500
Total	1,172	1,712	1,260	910	0	0	0	1,557,449

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

to delineate the extent of contaminant migration. Collectively, the wells will act as a monitoring network to assess migration beyond the plume boundary. During well installation, characterization data will be collected to refine modeling results for help in locating future monitoring wells. For this cost estimate, the costs only include monitoring.

Long–term monitoring of underground test areas will continue. Sites/facilities — such as cavities created by test shots or disposal wells creating a greater hazard to remediate than to leave as is — will be closed in place. This also assumes there is no threat to the public or to the environment due to migration or natural barrier failure.

The Underground Test Area has already conducted a dose risk evaluation to determine the threat to the workers and to the public. Given the anticipated tritium concentrations of 10^7 picocuries per liter, the maximum doses to workers during normal events are approximately 2.8 millirem per week. This dose compared to an administrative control of 500 millirem per year (or an average 9.5 millirem per week) for Nevada Test Site workers indicates that the work is within the Nevada Test Site limits. These doses were calculated using pessimistic scenarios to ensure that even the most improbable events are bounded.

Offsite Locations

The Offsite Locations (non–Nevada Test Sites) include nine sites in Nevada, New Mexico, Alaska, Colorado, and Mississippi used for underground nuclear explosive tests and experiments. The purposes of the tests were to study the peaceful uses of nuclear explosions and to perform studies related to underground seismic effects and warhead development.

The Offsite Locations were studied extensively prior to any testing, and the data from the studies will be used to conduct ground-water flow modeling. These models will be used to determine relative risk posed by each of the offsite locations. Additional data collection may be needed to complete the modeling and/or the risk assessment, but this cannot be determined until the extent of the existing information for each site is known. Long-term land use at the offsite locations is assumed to be unrestricted surficial use, but subsurface rights will continue to be restricted.

Most of the work planned for the Offsite locations will not involve dealing with hazardous or radioactive waste. A summary of Offsite Locations' history is included under individual State descriptions of contamination.

WASTE MANAGEMENT

The Nevada Test Site serves as a major disposal facility for low-level waste generated by other DOE installations. Historically, approximately 50 percent of the 481,000 cubic meters of waste disposed at the Nevada Test Site was generated onsite. Approximately 99 percent of waste now received, however, is from offsite generators. The Nevada Test Site is expected to receive up to 20,000 cubic meters of low-level waste per year. The volumes are based on current rates. The Nevada Test Site will receive 2,000 to 6,000 cubic meters per year of low-level mixed waste from offsite generators in FY 2005-2045. The volumes are based on modeled generators' projections for this report. Site costs are adjusted (negative numbers in the Waste Management Tables) to reflect funding transferred to the Nevada Test Site to account for costs associated with the disposal of environmental restoration activity wastes generated at other Departmental facilities. Waste management activities also include storage of mixed transuranic waste; construction of a Liquid Waste Treatment System for treatment of onsite low-level waste and mixed waste; and identification and

accumulation of Nevada Test Site-generated hazardous waste for disposal at a U.S. EPA-licensed offsite facility.

Commercial facilities will continue to be used for treatment and disposal of hazardous waste. Sanitary waste will continue to be the responsibility of the Defense Programs landlord.

Waste Treatment

The Nevada Test Site is planning to build two waste treatment facilities, the Liquid Waste Treatment System and the Transuranic Waste Certification Building. The decision framework and methodology used to identify, evaluate, and select treatment technologies and processes were developed in accordance with the Draft Site Treatment Plan development framework under the Federal Facility Compliance Act.

Liquid Waste Treatment System

This project is scheduled to be constructed in Area 6 during FY 1996 for handling, treating, and storing very large quantities of low-level waste and mixed waste effluents. Over 4 million gallons of liquid waste may be generated yearly from major Nevada Test Site programs including the Underground Test Storage Remedial Investigation/Feasibility Study project. The Liquid Waste Treatment System will have process systems for solids separation of contaminated drilling and sampling effluent, for stabilization of residual mixed waste sludge, and for drying of residual low-level waste sludge. The system will also have a series of above ground, double-lined reservoirs for volume reduction of liquid through evaporation. Treatment of RCRA hazardous waste will start in FY 1997.

Transuranic Waste Certification Building

This project is scheduled to be constructed in FY 1999 for breaching, sampling, and certifying all Nevada Test Site mixed transuranic waste (612 cubic meters) for disposal at the Waste Isolation Pilot Plant in Carlsbad, New Mexico. This facility, to be located at the Area 5 Radioactive Waste Management Site, is necessary to certify that waste meets the Waste Isolation Pilot Plant Waste Acceptance Criteria prior to shipping transuranic waste offsite. It is assumed operations will last five years and shipment will occur in 2005.

One low-level mixed waste stream in the current Nevada Operations Office inventory is characterized sufficiently to determine fully

Major Waste Management Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Liquid Waste Treatment Storage	500	0	0	0	0	0	0	3,000
LLW Disposal Facility	0	9,200	10,800	12,400	14,400	0	0	234,000
Mixed Waste Storage Pad	167	0	0	0	0	0	0	1,000
TRU Waste Certification Building	333	0	0	0	0	0	0	2,000

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

***Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

what technologies and capabilities are required for safe, environmentally sound, and compliant treatment and disposal. Area 23 Scintillation Vials consist of xylene-based scintillation cocktails generated from studies conducted at the Nevada Test Site for tritium migration in the environment. Approximately 15 liters of the scintillation cocktails are contaminated with tritium. These vials were shipped offsite to a commercial vendor (Quadrex) for treatment and disposal during December 1994.

The decision to retrieve waste or leave it in greater confinement disposal boreholes is contingent upon performance assessments required by 40 CFR 191 and/or upon risk assessments required by the CERCLA National Contingency Plan or RCRA Corrective Action. For this cost estimate, it was assumed the waste was left in place.

Waste Storage

Waste is accumulated and/or stored at one of three facilities at the Nevada Test Site, depending on its waste type. The following is brief summary of these facilities.

Transuranic Pad Cover Building

Construction was completed in FY 1994 on a covered structure to enclose part of the existing 2-acre asphalt pad used for storage of approximately 612 cubic meters of transuranic waste. This will protect the containers from weathering before the waste is shipped to the Waste Isolation Pilot Plant. The transuranic pad cover building has the capacity to store up to 2,600 cubic meters.

Mixed Waste Storage Pad

Construction of this project is scheduled to be completed in FY 1997. It consists of a covered concrete pad and apron with secondary containment to store Nevada Test Site mixed waste prior to treatment at onsite or offsite facilities. The pad is designed to store up to 1,600 cubic meters.

Expanded Hazardous Waste Accumulation Site

This project is scheduled to be constructed in FY 1997 and will provide for a 275 square-meter expansion of the existing Hazardous Waste Accumulation Site to compliantly store hazardous waste before it is shipped to a commercial facility. The expansion is required to avoid exceeding the 90-day accumulation limit while the analysis of waste samples is completed. The Nevada Operations Office proposes to permit the Hazardous Waste Accumulation Site as a RCRA Treatment, Storage, and Disposal facility, allowing storage up to one year prior to shipment offsite for treatment and disposal.

Waste Disposal

The Nevada Test Site accepts and disposes low-level waste at the Area 3 and Area 5 Radioactive Waste Management Sites from approved DOE and Department of Defense facilities across the United States. Currently, there are 13 approved generators. Approval to ship waste to the Nevada Test Site is granted only after the waste generator certifies all waste meets the Nevada Test Site's rigorous acceptance standards established in the Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements (NVO–325, Rev. 1). At the current rate of land use, the facility can be expected to provide disposal capacity of 3,000,000 cubic meters in the next 100 years. The Nevada Operations Office conducts site monitoring and characterization activities in support of the low-level waste disposal operations at the Areas 3 and 5 Radioactive Waste Management Sites. Other projects to support low-level waste disposal include use of

the best available technology for closure of existing and future waste disposal units to protect public health and the environment.

The Nevada Test Site is one of the sites being evaluated for disposal of mixed waste. A performance evaluation will be conducted to address the collection of site-specific data related to the natural surroundings, geological setting, ground water and surface water characteristics, and other factors related to the disposal capabilities of the site. This information will then be used to evaluate the site and to determine the types and quantities

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Transuranic Waste	1,616	1,375	1,375	1,375	1,375	1,375	1,137
Low-Level Mixed Waste	11,127	9,471	9,471	9,471	9,471	9,471	7,953
Low-Level Waste	80	365	186	153	17	0	0
Storage and Handling							
Transuranic Waste	3,427	2,462	2,462	2,462	2,462	2,462	2,314
Low-Level Waste	0	0	1	1	0	0	0
Disposal							
Low-Level Mixed Waste	1,694	6,401	5,732	6,609	3,846	3,682	4,110
Low-Level Waste	11,815	12,671	17,697	11,829	5,433	3,694	2,534
Hazardous Waste	3,908	3,460	3,863	3,326	3,326	3,326	3,326
Sanitary Waste	594	506	506	506	506	506	506
Inter-Site Disposal Assessment							
Low-Level Mixed Waste	-1	0	0	0	0	0	0
Low-Level Waste	-5,042	-4,005	-8,353	-6,068	-17	0	0
Total	29,216	32,706	32,940	29,662	26,418	24,515	21,879

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Transuranic Waste	149	0	0	0	0	0	0	50,504
Low-Level Mixed Waste	1,503	0	0	0	0	0	0	350,812
Low-Level Waste	0	0	0	0	0	0	0	4,086
Storage and Handling								
Transuranic Waste	1,453	296	0	0	0	0	0	102,414
Low-Level Waste	0	0	0	0	0	0	0	8
Disposal								
Low-Level Mixed Waste	3,057	2,082	2,070	1,758	1,685	338	0	217,013
Low-Level Waste	1,845	362	360	306	293	59	0	356,307
Hazardous Waste	3,326	3,326	0	0	0	0	0	159,853
Sanitary Waste	506	506	0	0	0	0	0	23,785
Inter-Site Disposal Assessment								
Low-Level Mixed Waste	0	0	0	0	0	0	0	-7
Low-Level Waste	0	0	0	0	0	0	0	-122,468
Total	11,839	6,573	2,431	2,064	1,979	397	0	1,142,309

* Costs reflect a five-year average in constant 1995 dollars except in FY 1995-2000, which is a six-year average.

**Total Life Cycle is the sum of annual costs in constant 1995 dollars.

of waste suitable for disposal at the Nevada Test Site. For the purposes of the Baseline Environmental Management Report analysis, a mixed-waste disposal facility is assumed to be constructed to receive offsite waste as soon as FY 1998.

It is important to note the identification of mixed waste disposal activities at the Nevada Test Site will follow State and Federal regulations for siting and permitting. It will also include public involvement in the decisionmaking process and during preparation of the site-wide Environmental Impact Statement. The Nevada Test Site could be disposing of mixed waste as soon as FY 1998 if it is approved through the aforementioned process.

Other Projects in the Environmental Restoration table consist of capital construction projects to support waste disposal operations for the Area 3 and Area 5 Radioactive Waste Management Sites at the Nevada Test Site. A closure cap is scheduled for construction for a waste pit at the Area 3 Radioactive Waste Management Site. Reconstruction of Road 5-01 to maintain safe transportation to the Area 5 Radioactive Waste Management Site is scheduled to be completed in FY 1997. Other projects scheduled in FY 1994 consist of an upgrade to the power distribution line to the Radioactive Waste Management Sites. Projects scheduled in FY 1995 consist of a controlled area access building and a 25-year storm protection dike for the Area 5 Radioactive Waste Management Site.

Future projects consist of capital construction line item projects to support waste disposal operations for the Nevada Test Site. Construction of the Area 3 and 5 pit closures are planned to begin in FY 2005 and to last through 2020. The closures of waste pits are dependent upon the amount of low-level waste the Nevada Test Site receives in the next 10 years from offsite generators.

NUCLEAR MATERIALS AND FACILITY STABILIZATION

The facility stabilization and maintenance process began at the Nevada Test Site in 1995. All of the 289 Nevada Test Site facilities are currently in the stabilization process. Some of these facilities include buildings and equipment used to evaluate nuclear test effects, explosives magazines, fallout shelters, railroad boxcars used for storage, and various office buildings. The resulting waste types include the following: hazardous, transuranic, low-level, and low-level mixed. This report arbitrarily assumes the stabilization and maintenance process at the Nevada Test Site will be completed by 2012.

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	109	40,935	34,581	1,635	0	0	0	386,413

** Costs reflect e five-year averege in constent 1995 dollars except in FY 1995-2000, which is a six-year average.*

***Totel Life Cycle is the sum of ennual costs in constant 1995 dollars.*

LANDLORD FUNCTIONS

At the Nevada Operations Office, Environmental Management programs pay an allocation for contractor indirect costs, as well as select common support activities, which are provided by three management and operating (M&O) contractors and managed by the Department. The common support cost allocation pool was reduced by approximately $31 million from $68 million in FY 1995 by removing activities which could be recharged directly to the benefitting programs based upon use.

In FY 1996, the Nevada Operations Office will undergo a major change in M&O contractors. The three integrated M&O contracts expire and a single M&O contract will replace them. This will preclude the need for the Nevada Operations Office to allocate indirect–type common benefitting costs to participating programs because the single M&O contractor will manage those activities as they would any other indirect cost. However, as the Nevada Operations Office mission changes and refocuses in the years ahead, it is uncertain how the Environmental Management budget will be impacted. As other programs are reduced, the remaining programs may have to assume a larger percentage of the indirect costs of the Nevada Operations Office, and the cost of doing Environmental Management business at the Nevada Operations Office could increase dramatically.

Until the present, most infrastructure plant and capital equipment items have been budgeted by Defense Programs. In FY 1996, Defense Programs budgeted $37 million for plant and capital equipment to support all activities at the Nevada Operations Office. In FY 1997 and outyears, the other programs, including Environmental Management, may have to begin budgeting for additional plant and capital items provided by Defense Programs.

PROGRAM MANAGEMENT

Environmental Restoration

Environmental restoration activities conducted within this work scope support the Nevada Operations Office. Environmental restoration activities will characterize and remediate environmental conditions at the Nevada Test Site and at the offsite locations. The cost categories for this scope include Agreements-in-Principle, Grants, and Project Management Support. Program Direction within environmental restoration is a separate funding process and is not included in this section.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	15,233	14,591	11,631	10,071	5,817	4,341	3,740	

	2030	2040	2045	2050	2055	2060	Life Cycle**
Program Management	2,024	1,124	416	358	338	68	364,216

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Agreements-in-Principle

This effort funds the States of Alaska, Mississippi, and Nevada to provide oversight of the Nevada Operations Office environmental restoration activities. The Agreements-in-Principle describe the understandings and commitments between the parties regarding the Department's provision of technical and financial support for State activities in environmental oversight, monitoring, site access, and emergency response initiatives. Activities in Colorado and New Mexico will be addressed in amendments to existing Agreements-in-Principle managed by other Departmental offices.

Grants

This effort provides for educational and research opportunities for students and faculty at the University of Nevada at Reno and the University of Nevada at Las Vegas in support of technical programs being conducted at the Nevada Test Site.

Project Management Support

The Project Management Support activity provides for administrative and technical project management support and project planning, including Activity Data Sheet development; project control, including Project Tracking System and Performance Measurement System reporting; Interagency Agreement support; programmatic Quality Assurance and Self Assessment support; programmatic health and safety support; community relations support, including public involvement; general environmental support; and development of the Site-Wide Environmental Impact Statement.

Waste Management

Waste management activities conducted within this scope support the Nevada Operations Office Waste Management mission and its activities for treatment, storage, and disposal. The cost categories for this scope include waste minimization and program management. Program direction within Waste Management is included within funding for programmatic activities.

Waste Minimization/Pollution Prevention

The Nevada Operations Office has developed a Waste Minimization and Pollution Prevention awareness program for activities under its purview. The program is two-tiered, site-wide and generator specific. The Nevada Operations Office publishes the site-wide program plan and guidance. Each generator is responsible for developing a generator-specific implementation plan. To minimize generation of mixed waste, plans and procedures have been developed limiting the number and type of hazardous materials to be purchased or brought into an exclusionary zone. Wherever possible, nonhazardous substitute materials are used in place of hazardous materials.

Program Management

Activities related to program management consist of the Performance Measurement System that supports the Department's Progress Tracking System; cost estimating, scheduling, self validation, and value engineering efforts; the development of the Activity Data Sheets; site strategic planning required by Departmental Headquarters; administrative, technical, and legal services; and community relations regarding Environmental Management activities in Nevada.

Negotiations with the State of Nevada for a Federal Facility Agreement will be completed in FY 1995. The Nevada Operations Office will complete development of a site-wide Environmental Impact Statement in FY 1996.

Development of a Comprehensive Land Use Plan for the Nevada Test Site will also be completed in FY 1996.

Program Direction

Funding under this category is used for the Nevada Operations Office Waste Management Division, which provides staff oversight and management of the treatment, storage, and disposal of waste.

Public Participation

Current and potential Environmental Management programs at the Nevada Test Site generate a high level of public interest in Nevada and surrounding States. In response to this interest, and in conjunction with Departmental guidelines, a public participation program has been developed by the Nevada Operations Office as a mechanism for providing consistent dialogue and interaction between the organization and its stakeholders. The Nevada Operations Office is providing financial and human resources to identify the public's concerns, needs, and values prior to making decisions; to provide timely information to the public and solicit comments on the Nevada Test Site plans, activities, and priorities; to fulfill all applicable State and Federal regulatory requirements regarding public involvement; and to establish and maintain an active Community Advisory Board for Nevada programs.

Public meetings are scheduled to present information to be used to develop documents such as Environmental Impact Statements, Activity Data Sheets, land use plans, and transportation plans. Every effort is made by the Nevada Operations Office to maintain a continuous dialogue with city, county, and State officials, as well as local Native American communities and other interested members of the public who may be affected by Nevada Operations Office activities. A primary goal for the Environmental Management public participation program is to communicate effectively to the stakeholders to foster understanding of the Department's mission to protect human health and the environment.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Nevada Test Site.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	44,637	65,644	83,570	83,078	18,334	900	1,345
Waste Management	29,365	33,134	33,197	29,789	26,418	24,515	21,879
Nuclear Material and Facility Stabilization	109	40,935	32,946	0	0	0	0
Program Management	15,259	14,665	11,675	10,093	5,817	4,391	3,740
Total	89,370	154,378	161,388	122,960	50,569	29,806	26,965

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	1,172	1,712	1,260	910	0	0	0	1,557,449
Waste Management	11,839	6,573	2,431	2,064	1,979	397	0	1,147,257
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	370,064
Program Management	2,024	1,124	416	353	338	68	0	365,070
Total	15,035	9,408	4,106	3,327	2,317	465	0	3,439,839

* *Costs reflect a five-yeer averege in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year everage.*

** *Totel Life Cycle is the sum of ennual costs in constent 1995 dollers.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Management	-148	-428	-257	-126	0	0	0	-4,948
Nuclear Material and Facility Stabilization	0	0	1,635	1,635	0	0	0	16,349
Program Management	-27	-73	-44	-22	0	0	0	-854
Total	-175	-507	1,334	1,487	0	0	0	10,547

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
Industrial Sites and Facilities	Begin Remediation	1995
	Complete Assessment	2010
	Complete Remediation	2020
	Complete Surveillance and Maintenance	2050
Plutonium-Contaminated Soils	Complete Assessment	2015
	Complete Remediation	2030
Underground Test Areas	Complete Assessment	1996
	Complete Remediation	2002
	Complete Surveillance and Maintenance	2030
NTS Offsite Locations	Complete Assessment	2006
	Complete Remediation	2015
	Complete Surveillance and Maintenance	2050
Waste Management: Treatment		Fiscal Year
Liquid Waste Treatment System	Complete Construction of Liquid Waste Treatment Facility	1996
TRU Waste Certification Building	Complete Construction of TRU Waste Certification Building	1998
Treatment: TRU Certification Building	Complete Operations	2004
Liquid Waste Treatment Operations	Complete Treatment Operations	2024
Waste Management: Storage/Handling		Fiscal Year
TRU Pad Cover Building	Complete Construction of TRU Storage Pad Cover Building	1994
Expanded Hazardous Waste Storage Unit	Complete Construction of Expanded Hazardous Waste Storage Unit	1997
Mixed Waste Storage Pad	Complete Construction of Mixed Waste Storage Pad	1997
Retrieve and Certify TRU Waste	Ship TRU Waste to WIPP	2005
Waste Management: Disposal		Fiscal Year
Construction	Complete Mixed Waste Disposal Unit	1998
Operations	Start operation of LLW Disposal Facility	2010
	Complete Operable Unit 3	2024
	Complete Operable Unit 4	2035
	Complete Disposal of LLW and LLMW	2059

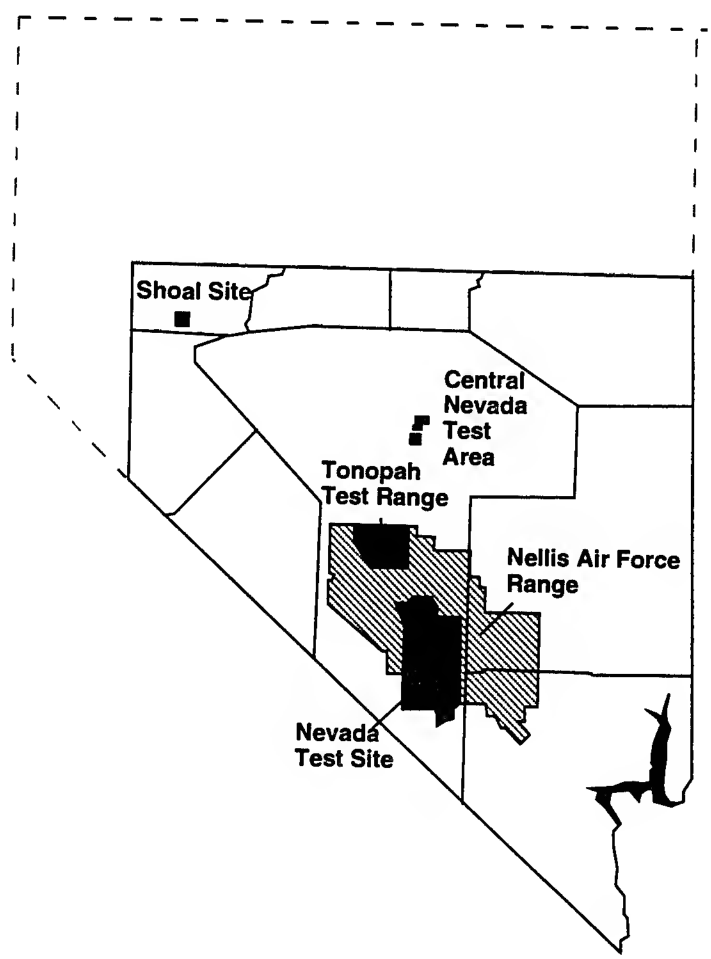
For further information on this site, please contact:

Public Participation Office (702) 295-4652
Public Affairs Office (702) 295-3521
Technical Liaison: Chuck Morgan (702) 295-0938

CENTRAL NEVADA TEST AREA, PROJECT SHOAL SITE & TONOPAH TEST RANGE
(Nevada Offsite Program)

The Nevada Offsite locations are administered by the Nevada Operations Office. A more thorough description of the EM environmental responsibilities for the Nevada Operations Office can be found in the Nevada Test Site narrative. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no Offsites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent defense.

The Central Nevada Test Area was a nuclear testing area, located in south-central Nevada, 60 miles northeast of the City of Tonopah. The Project Shoal Site is a weapons test location located 30 miles southeast of Fallon, Nevada. The Tonopah Test Range is located in the northwestern portion of the Nellis Air Force Range, about 150 miles northwest of Las Vegas and 40 miles southeast of Tonopah, Nevada.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	950	2,937	3,424	2,607	1,249	762

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Environmental Restoration	1,840	550	80	100	50	130	120	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle*****
Environmental Restoration	100	52	32	22	4	0	0	17,240

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The Central Nevada Test Area was used for one subsurface nuclear test (Project Faultless) detonated in January 1968 to determine the behavior of seismic waves in the geologic structure typical of the area. The Central Nevada Test Area is no longer in use. The land surface has been released for unrestricted use, with access controlled by the Department. Subsurface intrusion restrictions, however, are still in effect.

Project Shoal was conducted to determine the effect of a nuclear detonation in a granite rock formation and also to compare the seismic activity of natural earthquakes with activity from an underground nuclear explosion. It was a 12-kiloton device detonated at a depth of 1,211 feet (369 meters) in October 1963 to improve the ability to detect underground nuclear explosions.

The Tonopah Test Range is a research facility with the mission to test the mechanical operation and delivery systems for nuclear ordnance and other defense-related projects. The site was used to test ordnance delivery systems employing mock-ups of nuclear weapons, and tests with conventional explosives. The Tonopah Test Range is located in the northwestern corner of the Nellis Air Force Range and is still actively used by both Sandia National Laboratories and the Air Force.

The Shoal Site and Central Nevada Test Area are being monitored as part of the Long-Term Hydrological Monitoring Program conducted by EPA.

ENVIRONMENTAL RESTORATION

Funding for this activity provides for the evaluation of data collected at the Central Nevada Test Area and the Project Shoal site,

and the implementation of the RCRA work plans for the Tonopah Test Range. There are three properties associated with the Central Nevada Test Area, 1 associated with Project Shoal, and 42 under study at the Tonopah Test Range. This activity will define the magnitude and extent of surficial contamination and the risks associated with that contamination through the evaluation of information on the Central Nevada Test Area and the Project Shoal site. This process will include the characterization of the physical setting of the testing area, the definition and occurrence of contamination, and the identification of the pathways to a potential receptor. The risks to receptors will also be calculated using standard risk assessment procedures. Should risks exceed acceptable limits, the requirements for risk reduction through remediation or other actions will be established. In addition to assessment activities, any requirements for site cleanup or long–term monitoring at the Central Nevada Test Area and Shoal site will be established as part of this activity.

Test sites have been grouped into source categories. Assessment activities at the Tonopah Test Range will be conducted in accordance with a RCRA Facility Investigation Work Plan that will contain each of the source categories. U.S. Air Force-operated sites are not included in this technical scope because they are funded through the Department of Defense. Ancillary support facilities on and adjacent to the Tonopah Test Range associated with the historic tests as part of Operation Roller Coaster are included, although the actual shot areas are funded through the Soils Media Operable Unit. Sites that exceed RCRA action levels will be subject to remediation under this technical scope. Remediation may consist of soil removal, in situ cleanup methods (e.g.,

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Nevada Offsite - Nevada							
Assessment	532	150	20	0	0	0	0
Remedial Actions	1,308	400	60	100	0	0	0
Surveillance And Maintenance	0	0	0	0	50	130	120
Total	1,840	550	80	100	50	130	120

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Nevada Offsite - Nevada								
Assessment	0	0	0	0	0	0	0	4,044
Remedial Actions	0	0	0	0	0	0	0	10,646
Surveillance And Maintenance	100	52	32	22	4	0	0	2,550
Total	100	52	32	22	4	0	0	17,240

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

bioremediation), or ground-water treatment. Conventional unexploded ordnance will be detonated in place. Any explosive residue will be flashed on range, rendering debris nonhazardous, recyclable debris, or nonhazardous solid waste. Assessment activities at the Central Nevada Test Area and Shoal Site will be conducted in accordance with CERCLA. To assemble this estimate, remediation was assumed to consist of removal of mud pits at the Central Nevada Test Area and monitoring at the Shoal Site. These activities were assumed to begin in 1998 and be completed in 2015.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Environmental Restoration	1,840	550	80	100	50	130	120	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Environmental Restoration	100	52	32	22	4	0	0	17,240

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

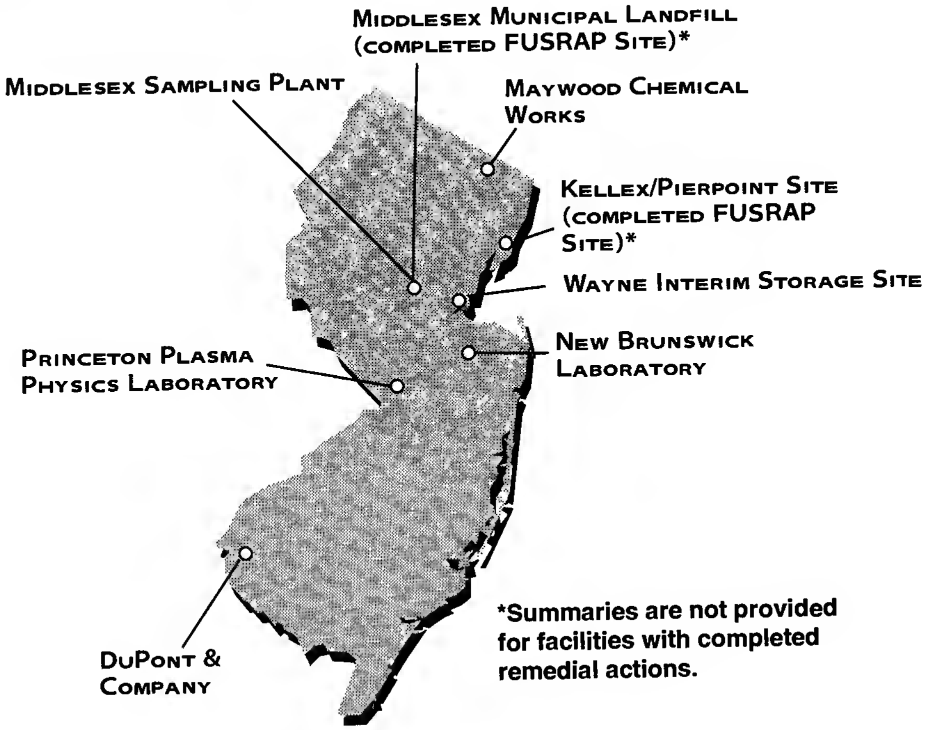
** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Nevada Offsite		Fiscal Year
	Complete Assessment	2006
	Complete Remediation	2015
	Complete Surveillance and Maintenance	2051

For further information on this site, please contact:

Public Participation Office	*(702) 295-4652*
Public Affairs Office	*(702) 295-3521*
Technical Liaison: Bobbie McClure	*(702) 295-1862*



*Summaries are not provided for facilities with completed remedial actions.

NEW JERSEY

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Princeton Plama Physics Laboratory	7,492	8,601	8,601	12,292	6,630	6,395
FUSRAP	21,000	23,790	22,060	35,690	51,800	42,010
Total - New Jersey	28,492	32,391	34,352	45,607	58,430	48,405

* *Costs for FY 1995 reflect Congressionel Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenerio, costs for sheded aree assume 3% ennuel inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Princeton Plama Physics Laboratory	7,985	3,742	3,562	3,793	3,763	3,755	3,459	158,287
FUSRAP	32,592	23,055	14,054	11,738	0	0	0	439,785
Total - New Jersey	40,577	26,797,	17,616	15,531	3,763	3,755	3,459	598,072

** *Costs reflect e five-year everege in constent 1995 dollars, except in FY 1995 - 2000, which is e six-yeer everage.*

*** *Total Life Cycle is the sum of ennuel costs in constent 1995 dollars.*

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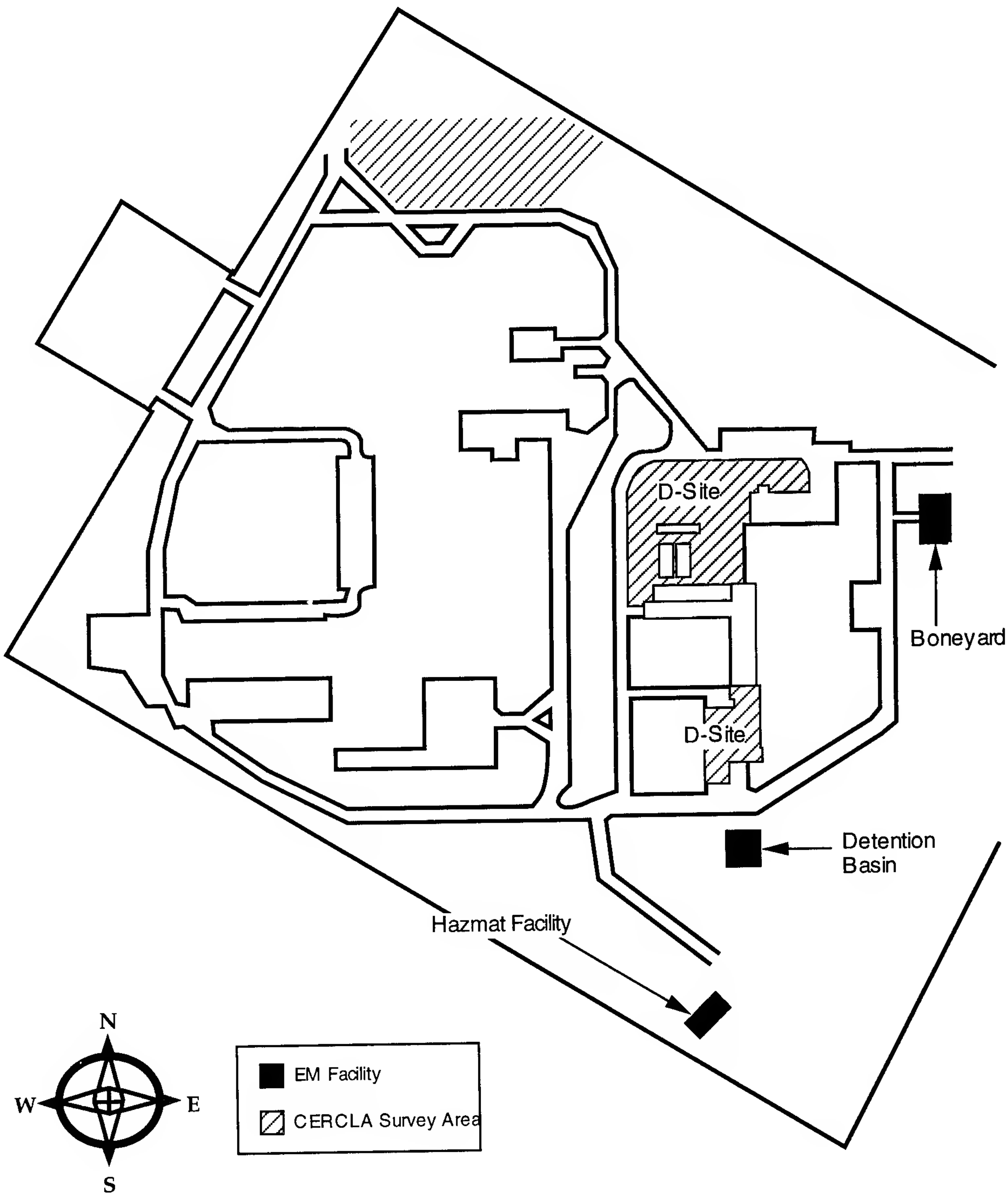
PRINCETON PLASMA PHYSICS LABORATORY

The Princeton Plasma Physics Laboratory is located adjacent to the Princeton University Campus in Princeton, New Jersey. It was established in the 1950's to conduct research on nuclear fusion.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	0	250	2,029	1,278	829	1,680
Waste Management	7,005	7,815	9,730	8,082	5,191	4,149
Program Management	487	536	533	557	610	566
Total	7,492	8,601	12,292	9,917	6,630	6,395

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded eree assume 3% ennuel inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	918	274	95	325	296	287	172	12,756
Waste Management	6,559	3,083	3,083	3,083	3,083	3,083	2,913	130,992
Program Management	508	385	385	385	385	385	374	14,538
Total	7,985	3,742	3,562	3,793	3,763	3,755	3,459	158,287

** Costs reflect e five-yeer everage in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year average.

*** Total Life Cycle is the sum of annual costs In constant 1995 dollers.

PAST, PRESENT, AND FUTURE MISSIONS

Fusion research at Princeton began in the early 1950's with the construction of small devices to study magnetic confinement of plasmas (hot, ionized gases). Research at Princeton Plasma Physics Laboratory began in 1959 with construction of a model C-stellarator (a larger scale device for confining plasmas), which was later coverted to a pulse-operated tokamak device. There are currently two major research devices at the Princeton Plasma Physics Laboratory, the Tokamak Fusion Test Reactor and the Princeton Beta Experiment-Modification.

The Princeton Plasma Physics Laboratory has played a major role in the Department of Energy's (DOE) magnetic fusion energy program aimed at developing fusion as an environmentally attractive, and sustainable energy source. The Princeton Plasma Physics Laboratory continues to conduct fusion research and development focusing on a succession of larger and more powerful devices for magnetic confinement. It is assumed the Princeton Plasma Physics Laboratory will continue to operate as a national laboratory focused on fusion research for the foreseeable future.

ENVIRONMENTAL RESTORATION

A completed Comprehensive Environmental Response, Compensation and Liability Act inventory report identified eleven potential contamination "source" areas for the Princeton Plasma Physics Laboratory. These sources are any areas where a hazardous substance was managed, plus associated media impacted by contamination migration. Several areas were found to have contaminant levels below "action" levels, and several others have been combined to facilitate investigation. Contamination sources include former wastewater treatment plant facilities, soil contaminant from several localized sites, a cooling tower and its adjacent soils, the chromate reduction pits, and a hazardous waste satellite accumulation area.

The principal environmental media of concern at the Princeton Plasma Physics Laboratory is ground water, and to a lesser extent, soil. The principal contaminants of concern are volatile organic compounds (petroleum hydrocarbons and solvents).

The preliminary remedial action strategy developed for these areas includes soil vapor extraction with possible off-gas treatment for soils contaminated with volatile organic compounds, and limited excavation and treatment for potential chromium contaminated soils. This strategy may change once the Remedial Investigation/Remedial Alternative Analysis has been completed in 1996. Remediation is expected to get underway in 1997, and residual soil and/or ground-water impacts from petroleum hydrocarbons which leaked from underground storage tanks may be incorporated into the remediation system, if warranted. Waste generated as a result of remedial actions will be funded and managed within environmental restoration activities.

WASTE MANAGEMENT ACTIVITIES

The Princeton Plasma Physics Laboratory is expected to continue to operate under the direction of the DOE's Office of Energy Research for the foreseeable future. Environmental restoration activities are scheduled to end by 2030 at assumed funding levels. However, Laboratory operations will

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	45	0	0	0	0	0	0	270
Remedial Actions	873	274	95	325	296	287	172	12,486
Total	918	274	95	325	296	287	172	12,756

* Costs reflect a five-yaar average in constant 1995 dollars, except in FY 1995-2000, which is a six-yaar average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

continue to generate waste. Continuing waste management activities in support of ongoing programs are projected at a cost of approximately $3 million per year, well above the figure associated with environmental restoration activities. To facilitate the development of the baseline environmental management life-cycle cost estimate, an arbitrary cut-off date of 2029 has been assigned to all sites that have completed environmental restoration but maintain ongoing waste management support of other Department programs (Energy Research, Defense Programs, etc.).

Waste management costs in FY 1997 reflect the decision by Energy Research to retrofit the Tokamak Fusion Test Reactor and to transfer

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-Level Mixed Waste	3,238	1,522	1,522	1,522	1,522	1,522	1,376	64,361
Low Level Waste	276	130	130	130	130	130	106	5,436
Hazardous Waste	2,866	1,347	1,347	1,347	1,347	1,347	1,347	57,620
Sanitary Waste	178	84	84	84	84	84	84	3,573
Total	6,559	3,083	3,083	3,083	3,083	3,083	2,913	130,992

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Waste Management Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Radioactive Waste Storage	333	0	0	0	0	0	0	2,000

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

the resulting waste to Princeton Plasma Physics Laboratory's waste management activity for storage, handling, and disposal. The Radioactive Waste Storage Facility is a new facility intended to support dismantlement of the Tokamak Fusion Test Reactor. The facility will handle prepackaged radioactive waste materials generated by Tokamak Fusion Test Reactor dismantlement, and by future experimental activities.

Waste Treatment

Princeton Plasma Physics Laboratory does not treat waste onsite. All wastes are shipped to appropriate facilities offsite for treatment.

Waste Storage

Radioactive and mixed waste resulting from experimental operations conducted at Princeton Plasma Physics Laboratory are currently handled and stored in a Resource Conservation and Recovery Act-permitted 90-day outdoor storage area prior to direct shipment to offsite approved depositories.

Waste Disposal

Waste is shipped to offsite facilities for disposal. Radioactive waste is currently shipped to DOE's Hanford facility in Washington. Hazardous waste is handled by commercial brokers and facilities.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material or facility stabilization activities at Princeton Plasma Physics Laboratory.

LANDLORD FUNCTIONS

Currently, landlord activities at Princeton Plasma Physics Laboratory are the responsibility of DOE's Office of Energy Research. The Environmental Management program at the Princeton Plasma Physics Laboratory supports landlord activities through a percentage of overhead which is calculated on an annual basis, based on programs funded at the Laboratory. There are no plans for the Environmental Management program to assume landlord functions at the site.

PROGRAM MANAGEMENT

Program management at Princeton Plasma Physics Laboratory is limited to program planning and direct management of projects, and to waste minimization activities. Princeton Plasma Physics Laboratory does not fund any grants or Agreements-In-Principle at this time.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Princeton Plasma Physics Laboratory.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	508	385	385	385	385	385	374	14,538

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	918	274	95	325	296	287	172	12,756
Waste Management	6,559	3,083	3,083	3,083	3,083	3,083	2,913	130,990
Program Management	508	385	385	385	385	385	374	14,538
Total	7,985	3,742	3,562	3,793	3,763	3,755	3,459	158,287

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Ground Water Character./Remediation - Submit Title I	1997
	Ground Water Character./Remediation - Submit Title II	1998
Waste Management		Fiscal Year
	Waste Operations - Complete TFTR waste disposal	2000
	UST Remediation - Complete disposal of contaminated soils	1995
	Stormwater Detention Cell - Start Construction	1997
	Stormwater Detention Cell - Complete Construction	1997
	Radioactive Waste Handling Facility - Start Construction	1995
	Radioactive Waste Handling Facility - Complete Construction	1996

For further information on this site, please contact: *Public Participation Office* *(708) 252-8796*
Public Affairs Office *(708) 252-2010*
Technical Liaison: Michael Ferrigan *(708) 252-2570*

NEW JERSEY FUSRAP SITES

DuPont, Middlesex, Maywood, Wayne, and New Brunswick constitute the New Jersey sites within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and Atomic Energy Commission sites to reevaluate their radiological condition and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States and is funded through the Oak Ridge Operations Office. The model used to estimate costs for this report provides one cost for all of the FUSRAP sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	21,000	23,790	22,060	35,690	51,800	42,010

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	32,592	23,055	14,054	11,738	0	0	0	439,785

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

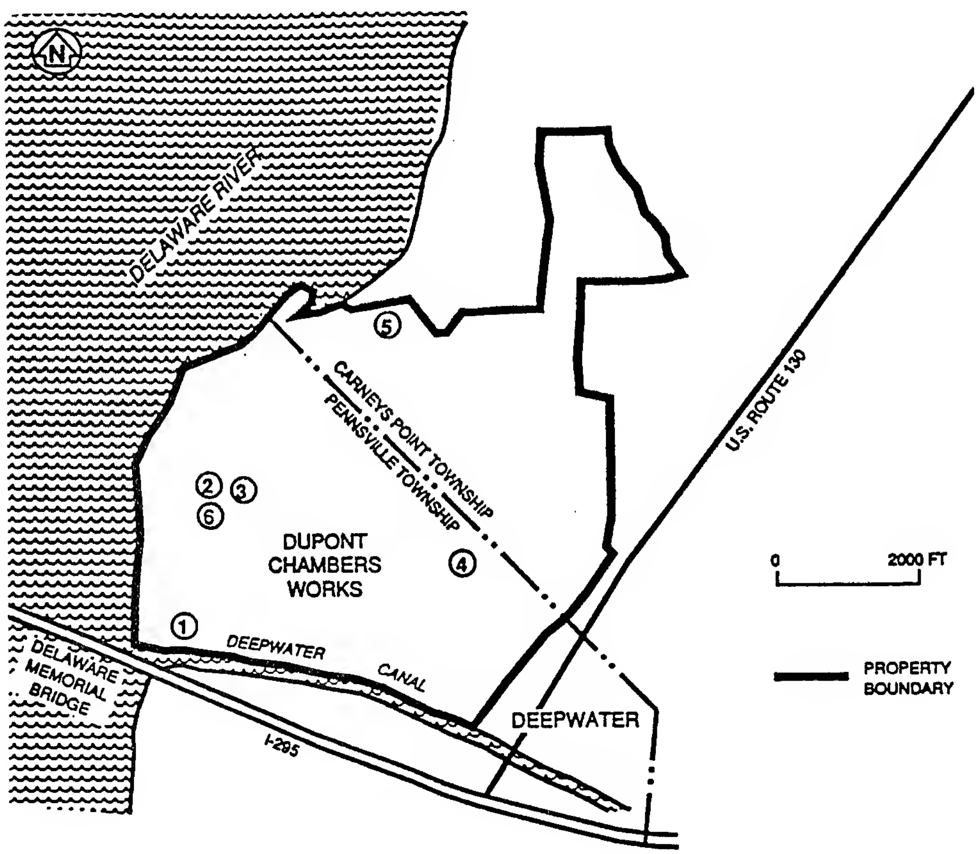
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	32,592	23,055	14,054	11,738	0	0	0	439,785

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

DUPONT AND COMPANY
(Formerly Utilized Sites Remedial Action Program)

This 700-acre site was referred to as the Chambers Dye Works of DuPont. It is located in both Pennsville and Penns Grove Townships on the north shore of the Delaware River, near the Delaware Memorial Bridge and adjacent to the residential community of Deepwater.



SURVEYED AREAS:

1. BUILDING J-26 (FORMERLY BUILDING J-16)
2. F CORRAL (PARKING LOT)
3. BUILDING 845
4. EAST BURIAL AREA
5. LAGOON A
6. CENTRAL DRAINAGE DITCH

PAST, PRESENT, AND FUTURE MISSIONS

DuPont operations included development of a process for converting uranium oxide to uranium tetrafluoride; production of uranium peroxide, uranium metal, and uranium hexafluoride; and various related research activities. These activities took place between 1942 and 1947. Following initial decontamination activities, the site was released to the current owner, E.I. du Pont de Nemours and Company, in 1948.

The final remedial action at the site depends on resolution of the decision document. Options range from onsite disposal to removal to an offsite location for disposal.

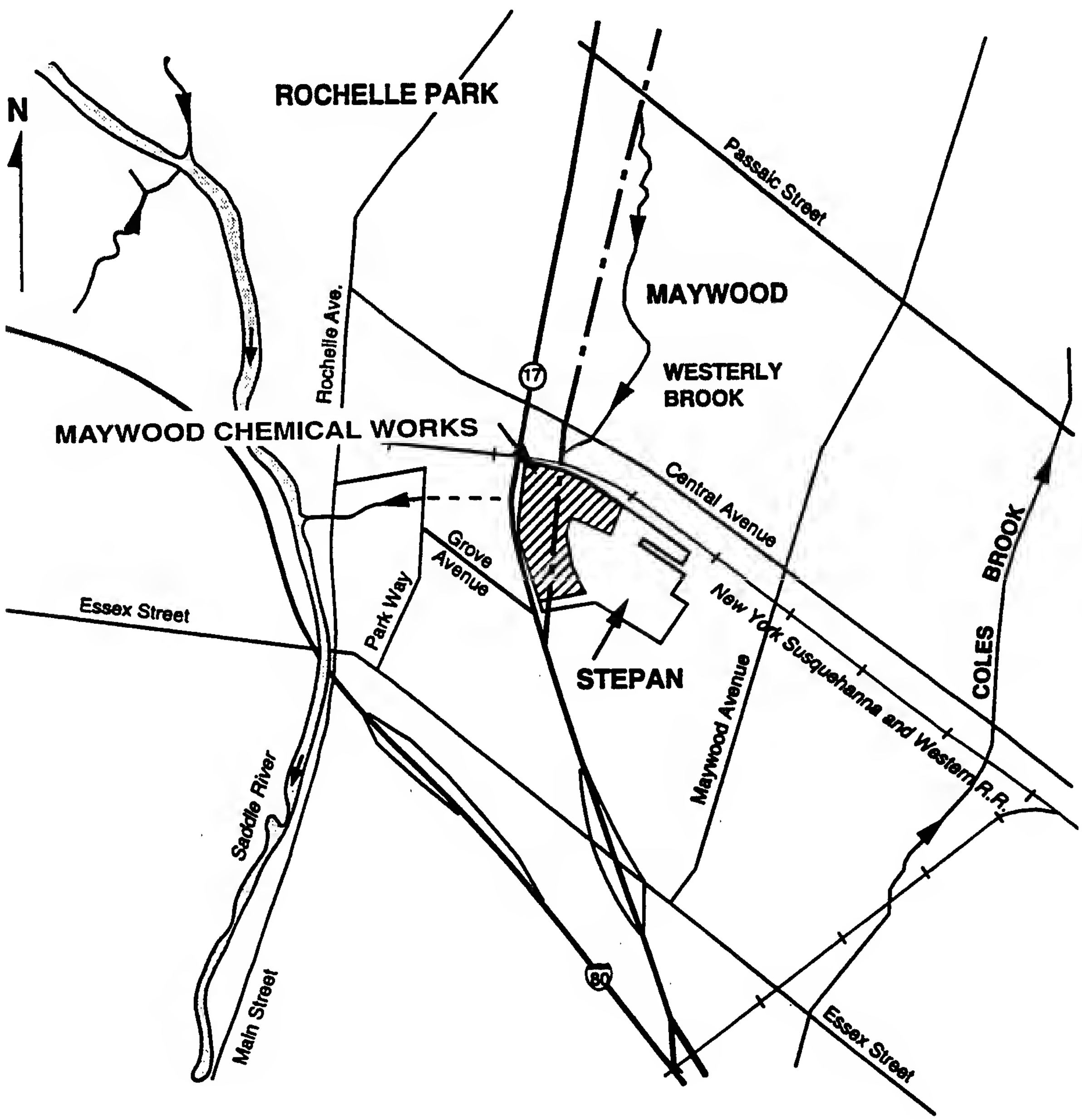
ENVIRONMENTAL RESTORATION

Of the three buildings involved with uranium research activities, two were demolished and one has since been used as a warehouse. The remaining building is contaminated. Rubble from the two buildings that were demolished was buried in an onsite lagoon and burial area. Other contaminated areas include a waste lagoon, a central drainage ditch, and a waste burial area. The waste volume for this site is estimated to be 8,270 cubic yards.

For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*

MAYWOOD CHEMICAL WORKS
(Formerly Utilized Sites Remedial Action Program)

The Maywood site is located in a highly developed area in Maywood and Rochelle Park, Bergen County, New Jersey, and consists of approximately 12 acres with several warehouses and processing buildings. The Maywood site located at 100 Hunter Avenue consists of an interim storage facility and several vicinity properties. There are 83 vicinity properties, some of which have been remediated.



PAST, PRESENT, AND FUTURE MISSIONS

From 1916 to 1956, Maywood Chemical Works processed monazite sands to extract thorium for use in gas lamp mantles and for other commercial uses. Processing was stopped in 1956 after about 40 years of production. Maywood produced thorium and lithium for the Atomic Energy Commission during the 1940's and 1950's.

The site was added to Environmental Protection Agency National Priorities List in 1983. Congressional action assigned cleanup responsibility to the Department of Energy (DOE) in the same year. The land was transferred to DOE ownership to provide an interim storage site for the waste from vicinity properties until a decision is made regarding its final disposition.

Future use of this site depends on resolution of the record of decision for the Maywood site. Options range from construction of a local waste disposal cell (for all Maywood waste, including those on vicinity properties) to shipment of all waste to another disposal site. Vicinity properties will be released for unrestricted use following cleanup.

ENVIRONMENTAL RESTORATION

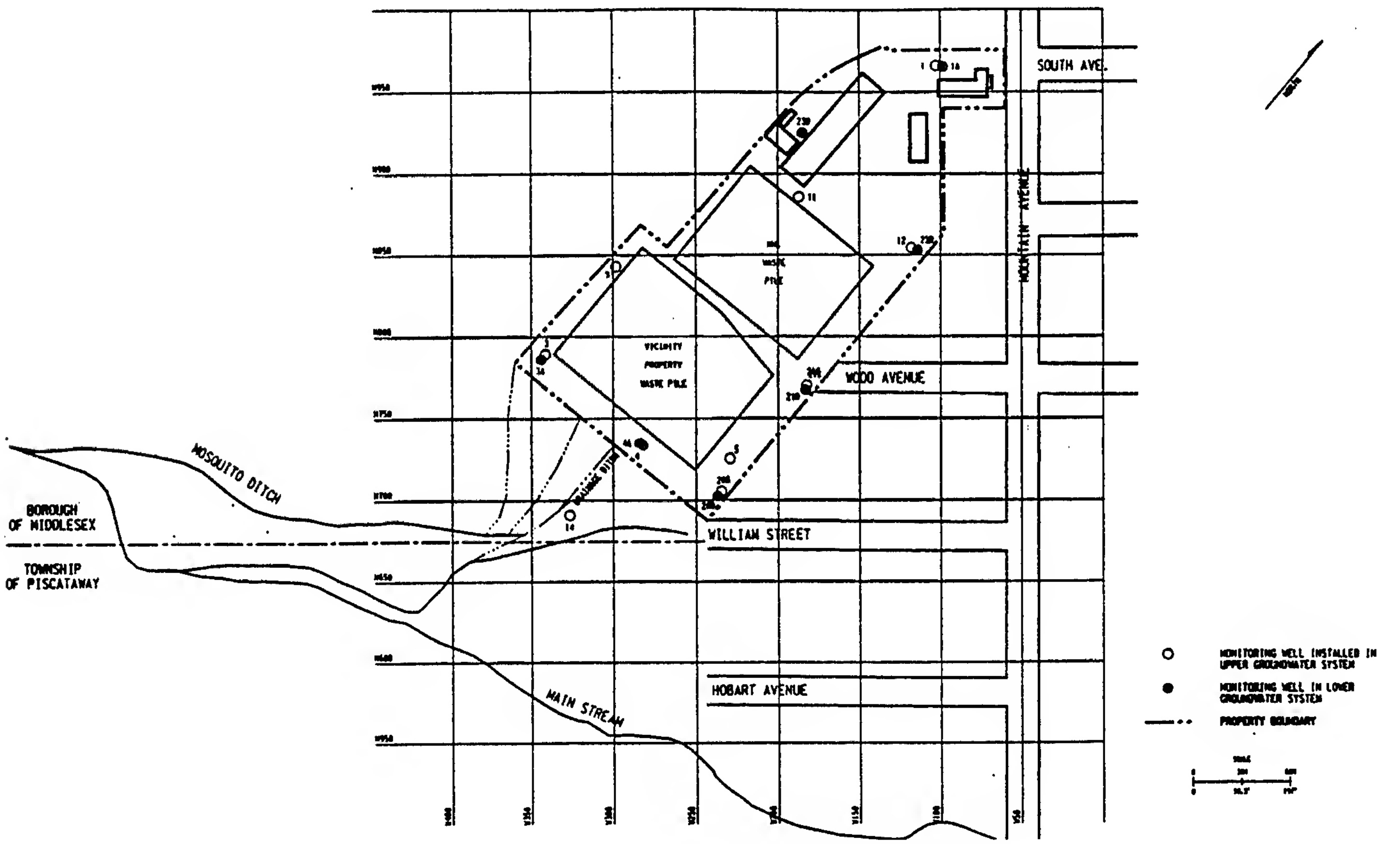
The waste consists of tailings from thorium ore processing. The waste volume is estimated to be 395,000 cubic yards. Waste from the thorium processing was slurried to dike areas west of the plant. Some of the waste was removed for use as fill on nearby properties, thereby contaminating the properties. Twenty-six vicinity property remediations have taken place with the storage of contaminated material at Maywood. The interim storage pile will be removed to a commercial disposal facility.

For further information on this site, please contact:

	Public Participation Office	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*

MIDDLESEX SAMPLING PLANT
(Formerly Utilized Sites Remedial Action Program)

The site located in the Borough of Middlesex New Jersey, approximately 35 miles northeast of Trenton.



PAST, PRESENT, AND FUTURE MISSIONS

The Middlesex Sampling Plant Site at 239 Mountain Avenue was used for sampling, weighing, assaying, and storing uranium and thorium ores between 1943 and 1955. The bulk of the Belgian Congo uranium ores and other uranium ores used by the United States was handled at this site. The residue from the processing of these ores was temporarily stored at Middlesex prior to its return to the vendor. The property covers 9.6 acres and includes four buildings. More than 70 percent of the site is covered with asphalt. All Atomic Energy Committee activities ended in 1967. The site was used as a training center by the U.S. Marine Corps from 1969 to 1979, and placed in Department of Energy custody in 1980.

The final remedy at the site depends on resolution of the decision document. Options range from onsite disposal to removal to an offsite location for disposal.

ENVIRONMENTAL RESTORATION

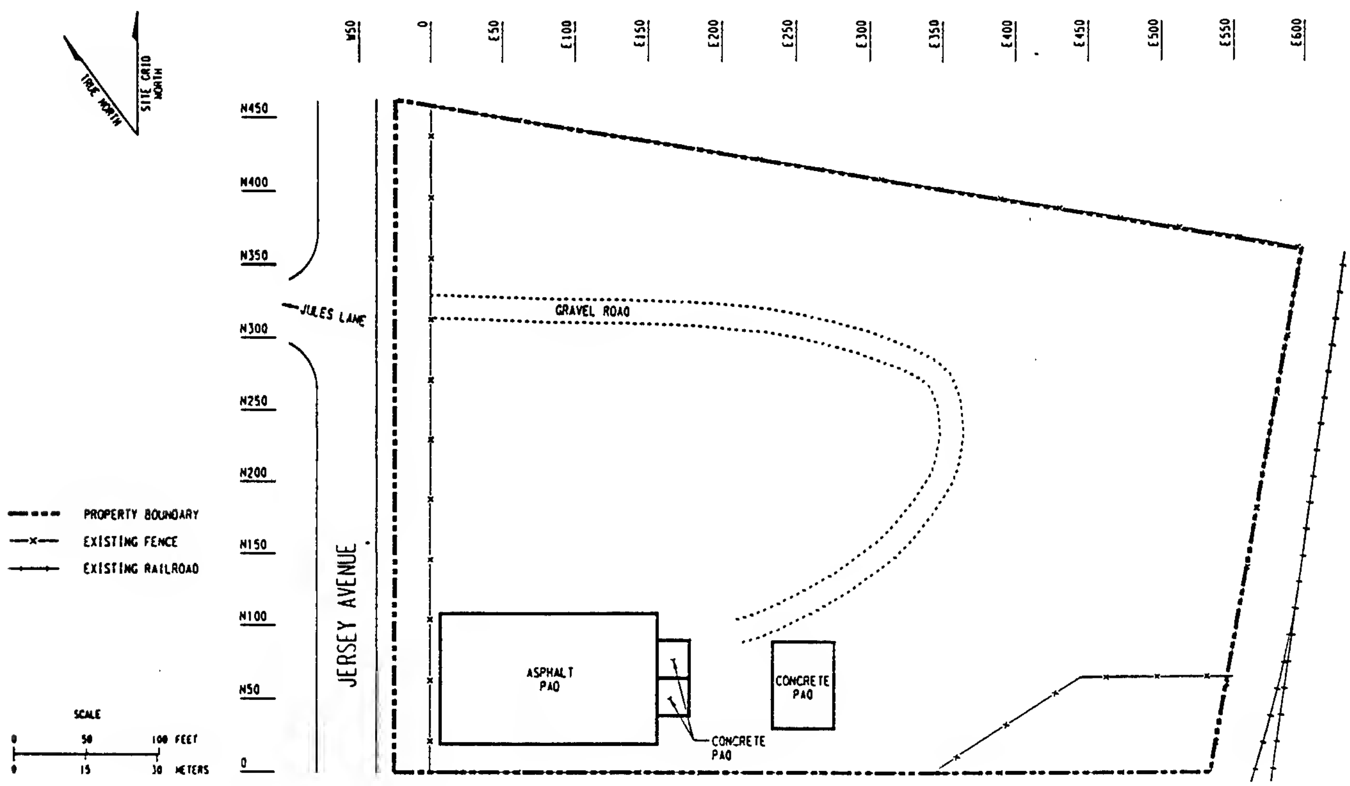
There are two storage piles that contain approximately 88,400 cubic yards of waste. Most of the waste is tailings from the uranium ores. There is also some mixed waste, containing lead, that is from the Middlesex landfill vicinity property.

Cleanup of vicinity properties, including the landfill, has been completed. Complete remediation is expected by FY 2011.

For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*

NEW BRUNSWICK SITE
(Formerly Utilized Sites Remedial Action Program)

The site is located about 30 miles from New York City and 60 miles from Philadelphia and covers 5.6 acres in a densely populated area; 30,000 people live within a mile of the site.



PAST, PRESENT, AND FUTURE MISSIONS

From 1948 to 1977 the New Brunswick Site was used as a general chemistry laboratory by the Atomic Energy Commission to the Department of Energy. In 1977, the facility was deactivated, and operations were transferred to the Argonne National Laboratory in Illinois. Industrial plants are adjacent to the site. The laboratory was comprised of a large main building, a plutonium laboratory complex, a hot-cell building, and nine ancillary structures.

This site will be released for unrestricted use following completion of cleanup activities.

ENVIRONMENTAL RESTORATION

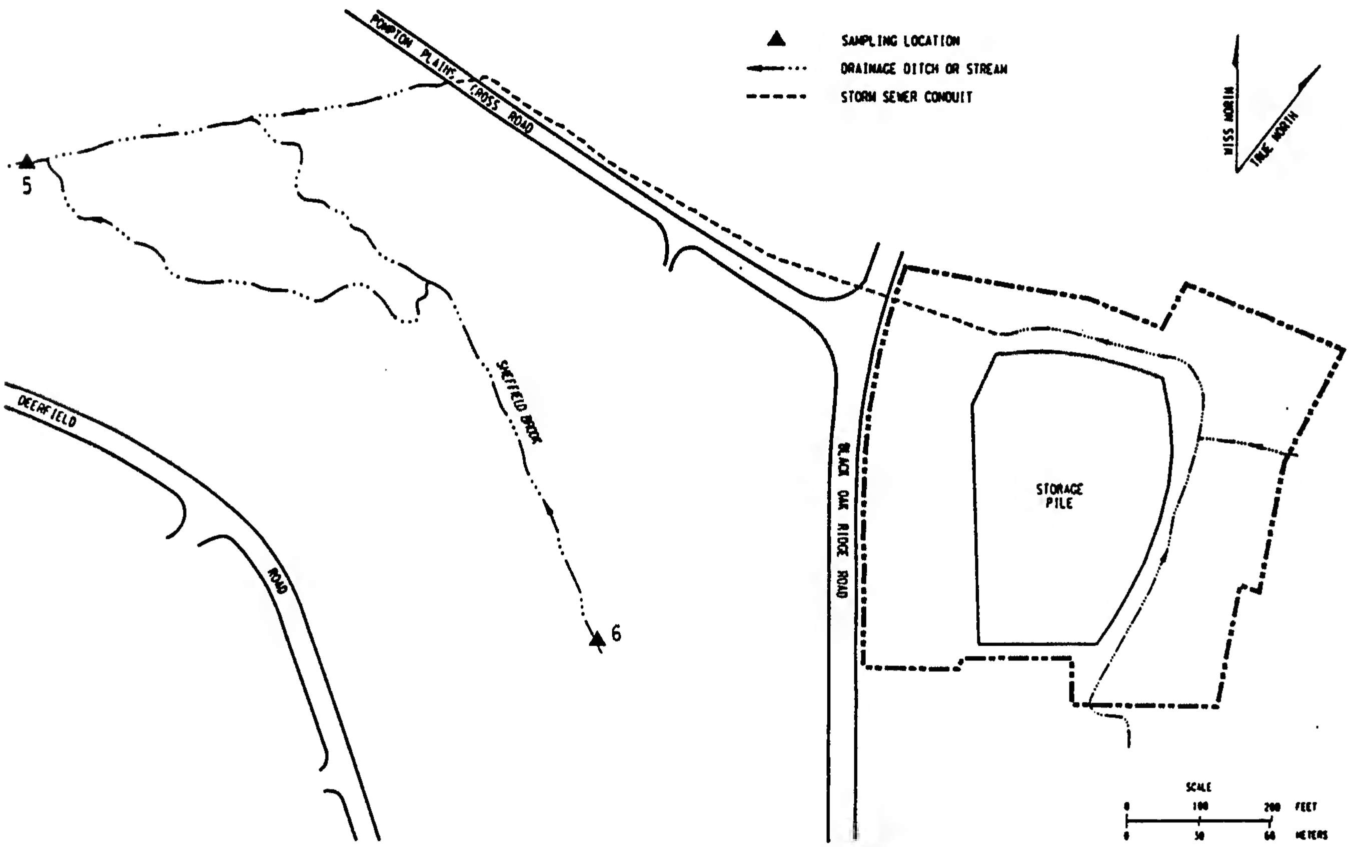
The total estimated volume of contaminated soil at the site is 4,500 cubic yards. The waste is low-level radioactive waste and contains radium and uranium. The laboratory has been decommissioned. The site is currently being monitored under a surveillance and maintenance program. Complete remediation is expected by FY 2011.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

WAYNE SITE
(Formerly Utilized Sites Remedial Action Program)

The 6.4-acre Wayne site is located at 868 Black Oak Ridge Road about 1.9 miles north of Wayne, New Jersey.



PAST, PRESENT, AND FUTURE MISSIONS

From 1948 through 1971, Rare Earths, Inc. and W.R. Grace and Company processed monazite sand (thorium ore) to recover thorium and other rare earth metals for use in the manufacturing of industrial products such as mantles for gas lanterns. In 1954, Rare Earth received a license from the Atomic Energy Commission to continue operations. The Davison Chemical Division of W.R. Grace acquired the facility in 1957, and processing activities continued until 1971.

Waste and residue from the processing operations included ore tailings, tritium sludges, and sulfate precipitates. Processing ceased in 1971 when the facility was licensed only for storage. The site was partially decontaminated by W.R. Grace in 1974. Some buildings were razed and the resulting rubble and processing equipment were buried on the property. The remaining buildings were decontaminated, and the disposal areas on the site were covered with clean fill. The storage license for the W.R. Grace plant was terminated in 1975 following site decommissioning. The Department of Energy acquired the site in 1984 under a Congressional mandate.

The site is surrounded by a chain link fence and contains one office building, a warehouse and a 2.7-acre interim waste storage pile. Several vicinity properties were contaminated at this site and have been remediated.

Future use of this site depends on resolution of the record of decision for the Wayne site. Options range from construction of a local disposal cell (for all Wayne waste, including those from vicinity properties) to shipment to another site disposal facility.

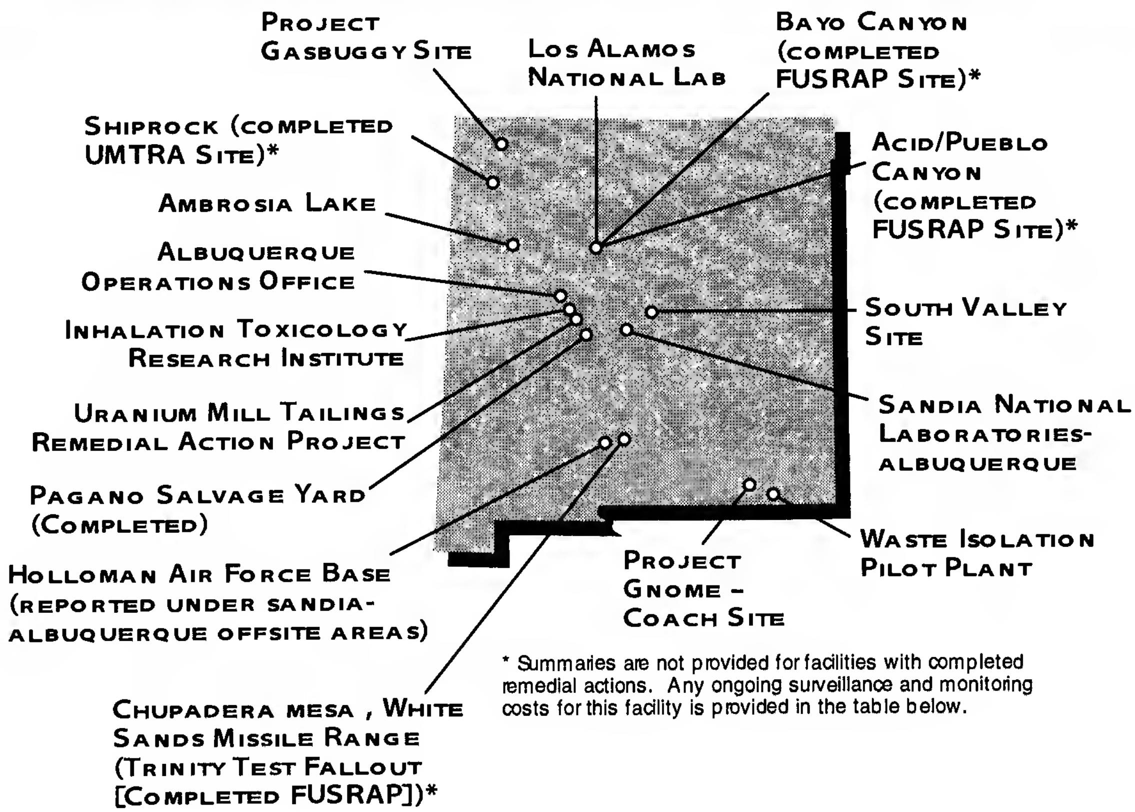
ENVIRONMENTAL RESTORATION

Process solid waste from the thorium operations was buried onsite and liquid waste was released to local storm drains. The storm drains empty into Sheffeld Brook, which overflows its banks during periods of heavy rainfall causing contamination to spread to nearby low lying areas. Remediation of these vicinity properties has been completed.

The Wayne Site is used specifically as an interim storage site for contaminated material removed during cleanup of the site and vicinity properties. The remedial investigation was completed in 1991-1992.

The volume of the waste (onsite and vicinity property) is estimated to be 109,000 cubic yards and consists of radioactively contaminated soil and building rubble generated during previous cleanup actions. The pile covers 16 waste burial pits of various sizes. The contaminants are primarily thorium contaminated material and thorium tailings. Remediation is anticipated to be complete by FY 2011.

For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*



* Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for this facility is provided in the table below.

NEW MEXICO

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Albuquerque Federal Office	31,760	28,284	29,837	30,332	31,824	32,763
Ambrosia Lake	390	260	10	0	0	0
Gasbuggy/Gnome-Coach Test Sites	130	1,480	1,480	3,130	3,280	2,130
Inhalation Toxicology Research Institute	2,694	2,644	1,368	1,272	1,080	1,080
Los Alamos National Laboratory	164,150	188,900	210,600	204,780	223,700	226,000
Sandia National Laboratories - Albuquerque	46,213	42,911	56,372	56,700	55,773	58,049
South Valley Superfund Site	2,136	4,590	956	735	735	735
Waste Isolation Pilot Project	174,050	186,700	193,400	195,800	197,400	198,500
Completed UMTRA-S&M	980	770	700	330	50	50
Total	422,503	456,539	497,723	493,079	513,842	519,307

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*(Five-Year Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Albuquerque Federal Office	25,485	14,940	14,443	14,697	15,740	18,071	17,568
Ambrosia Lake	119	0	0	0	0	0	0
Gasbuggy/Gnome-Coach Test Sites	1,817	175	80	47	16	8	6
Inhalation Toxicology Research Institute	1,340	547	547	547	547	547	466
Los Alamos National Laboratory	173,057	148,407	133,880	104,302	102,465	101,874	90,486
Sandia National Laboratories - Albuquerque	49,009	42,900	41,056	28,407	26,317	25,672	21,467
South Valley Superfund Site	1,576	871	972	880	0	0	0
Waste Isolation Pilot Project	167,409	158,444	148,656	140,836	129,460	129,460	129,460
Completed UMTRA-S&M	509	46	9	0	0	0	0
Total	420,321	366,330	339,644	289,716	274,545	275,633	259,452

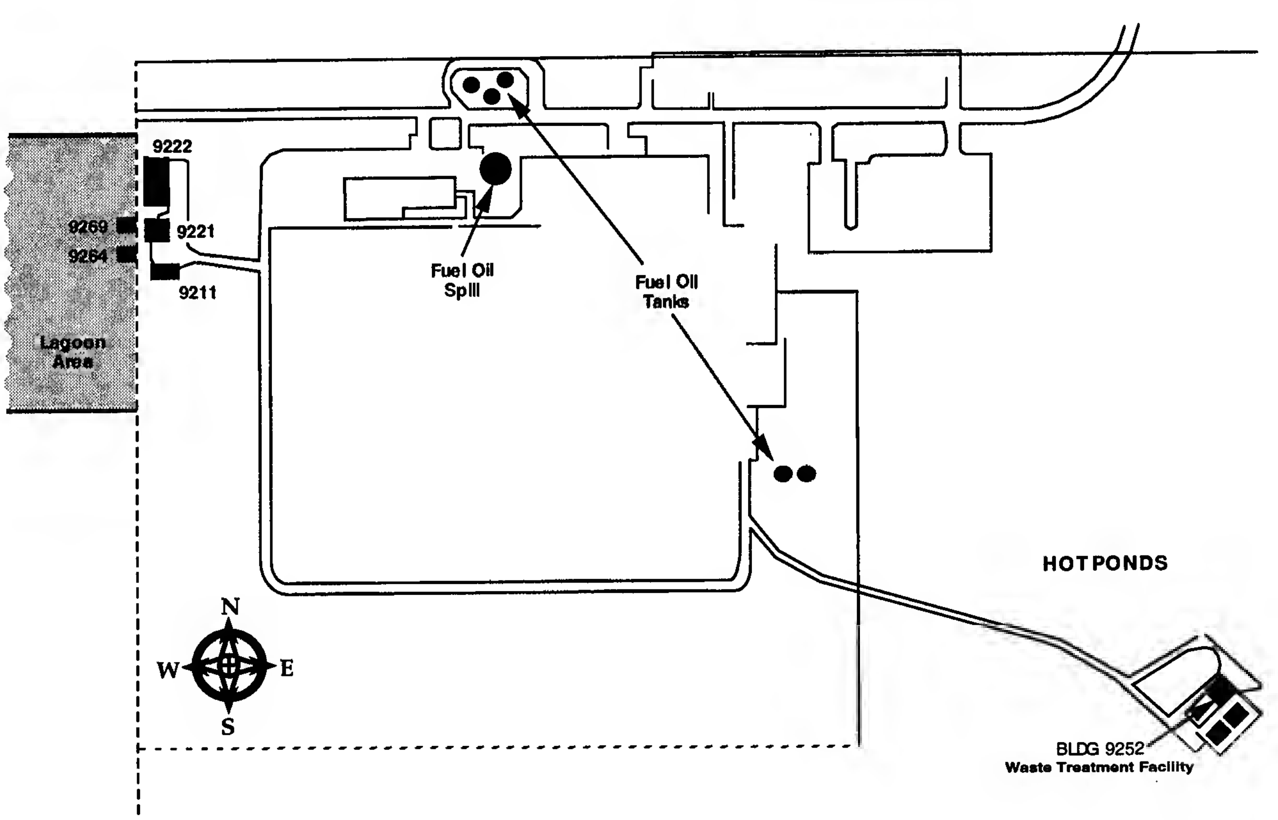
	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle
Albuquerque Federal Office	0	0	0	0	0	0	0	630,205
Ambrosia Lake	0	0	0	0	0	0	0	715
Gasbuggy/Gnome-Coach Test Sites	1	0	0	0	0	0	0	12,569
Inhalation Toxicology Research Institute	0	0	0	0	0	0	0	24,052
Los Alamos National Laboratory	0	0	0	0	0	0	0	4,445,415
Sandia National Laboratories - Albuquerque	0	0	0	0	0	0	0	1,223,145
South Valley Superfund Site	0	0	0	0	0	0	0	23,066
Waste Isolation Pilot Project	129,460	129,460	129,460	103,568	0	0	0	7,645,776
Completed UMTRA-S&M	0	0	0	0	0	0	0	3,327
Total	129,461	129,460	129,460	103,568	0	0	0	14,008,270

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

INHALATION TOXICOLOGY RESEARCH INSTITUTE

The Inhalation Toxicology Research Institute is located on the Kirtland Air Force Base directly south of the City of Albuquerque, New Mexico.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	1,362	1,320	240	160	0	0
Waste Management	530	530	540	540	540	540
Program Management	802	794	588	572	540	540
Total	2,694	2,644	1,368	1,272	1,080	1,080

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	503	0	0	0	0	0	0	3,016
Waste Management	499	438	438	438	438	438	373	15,805
Program Management	339	109	109	109	109	109	93	5,237
Total	1,340	547	547	547	547	547	466	24,052

** Costs reflect a five-year everage in constant 1995 dollers, except in FY 1995-2000, which is e six-year average.

*** Total Life Cycle is the sum of ennuel costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The Inhalation Toxicology Research Institute was established in 1960 to conduct research on the human health consequences of inhaling airborne radioactive materials. In the mid-1970's, the research program was expanded to investigate the potential health effects of airborne chemicals released from energy use and energy production sources, such as coal combustion and gasification plants, solar collectors, and light duty diesel engines. Beginning in the 1980's, the program shifted to more basic research on the human respiratory tract and its response to inhaled toxicants.

The Institute's current mission includes research, education, and technology transfer. It conducts high-quality research and links laboratory results with epidemiological findings to identify and reduce human health risks. Its basic and applied research will

continue for the foreseeable future. Research will evolve as energy generation technologies develop to maximize health and safety for energy workers and the public.

The Institute's research is directed by the Office of Energy Research. Environmental Management (EM) is responsible for the disposition of research-generated waste and for remediating a few contaminated areas.

ENVIRONMENTAL RESTORATION

The Institute's scientists conduct experiments using small quantities of radioactive materials and hazardous chemicals to determine potential detrimental effects of inhaling such substances. These toxic materials are potential sources of contamination at the site.

Contamination is known to be present in three areas at the site. The Institute is currently planning or conducting remediation of these areas. These projects are expected to be completed in FY 1996. The site will continue to be an industrial site within the secured confines of the Kirtland Air Force Base. All remediation will be performed to industrial standards.

Underground Fuel Tanks and Fuel Lines

Leaks from five underground fuel-storage tanks and piping have contaminated surrounding soils. All of the tanks and underground piping have been removed. Remediation work at four of the five storage tank sites has been completed by the Department of Energy (DOE) and approved by the New Mexico Environment Department in accordance with the Resource Conservation and Recovery Act (RCRA). Some minor assessment work remains at the final site and will be completed in FY 1995.

Holding Ponds for Low-level Radioactive Waste

Between 1963 and 1985, the Institute held low-level liquid radioactive waste in ponds lined with concrete and plastic. The concrete contains some surface contamination, and 3

Environmental Restoration Activity Costs

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	83	0	0	0	0	0	0	497
Remedial Actions	382	0	0	0	0	0	0	2,290
Surveillance And Maintenance	38	0	0	0	0	0	0	229
Total	503	0	0	0	0	0	0	3,016

* Costs reflect a five-year everege in constant 1995 dollars, except in FY 1995-2000, which is e six-year average.

** Total Life Cycle is the sum of annuel costs in constant 1995 dollars.

inches of soil beneath the ponds contain radioactive elements. In 1990, the contents of the ponds, including sludge and the plastic liner, were removed and sent to the Nevada Test Site for disposal. These ponds are being decommissioned, with completion scheduled for FY 1995.

Sewage Lagoons

Between 1963 and 1992, liquid sanitary sewage was discharged to lagoons (consisting of 6 cells within a 10-acre area). These lagoons were used for the treatment of all sewage generated at the Institute. They have been out of service since May 1992, when the Institute began using the city sewer system.

Slightly elevated levels of nitrite have been found in the ground water beneath the lagoons. The plan is to complete closure of these lagoons in FY 1995 and to continue monitoring and assessing the ground water until a final agreement with State regulatory officials is reached on how to proceed with remediation efforts.

WASTE MANAGEMENT

The main objective of waste management at the Inhalation Toxicology Research Institute is to manage hazardous and radioactive waste safely; minimize waste generated from all activities; and handle all generated waste in an environmentally sound manner. This analysis assumes that Environmental Management will continue to manage waste from energy research at Inhalation Toxicology Research Institute through fiscal year 2030.

The Institute generates small quantities of various types of waste, including radioactive waste, hazardous waste, and mixed waste. In 1993, the Institute generated about 32 cubic meters of low-level waste, 0.5 cubic meter of transuranic waste, 1 cubic meter of low-level mixed waste, 7 metric tons of hazardous waste, 0.1 metric ton of waste regulated by the Toxic Substances Control Act (TSCA), and 522 metric tons of sanitary waste.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-Level Mixed Waste	108	96	96	96	96	96	96	3,519
Low-Level Waste	161	142	142	142	142	142	116	5,103
Hazardous Waste	230	200	200	200	200	200	160	7,182
Total	499	438	438	438	438	438	373	15,805

* *Costs raflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Plans for the Management of Inhalation Toxicology Research Institute Waste

Inhalation Toxicology Research Institute waste is packaged and stored in two RCRA waste storage buildings. These buildings are also used for storing low-level radioactive, transuranic, mixed, and hazardous waste.

The Institute has shipped all of its low-level mixed waste to Sandia National Laboratory, New Mexico for treatment, storage, and disposal. Existing transuranic waste is scheduled to be transferred to storage facilities at Sandia National Laboratories on the Kirtland Air Force Base for consolidation. Small amounts of transuranic waste generated in the future will also be transferred to Sandia National Laboratories for storage until disposal at the Waste Isolation Pilot Plant begins.

The Institute will continue to store low-level waste in an interim storage facility. Once capabilities for treating mixed waste are developed, low-level mixed waste will be transferred to Sandia National Laboratories for treatment by the Lead Decontamination Unit and discrete quantities of nitric acid digest waste may be treated at the Inhalation Toxicology Research Institute and sent to the Nevada Test Site for disposal as low-level waste. In FY 1995, the Institute will submit a Proposed Mixed Waste Site Treatment Plan to the State of New Mexico in compliance with the Federal Facilities Compliance Act.

The Institute will continue discharging liquid sanitary waste to the Albuquerque Sewage Treatment Plant. Solid sanitary waste will continue to be shipped offsite to the Albuquerque City Landfill. In FY 1999, a wastewater pretreatment unit will be installed at the Institute to meet local regulatory standards.

A waste processing building and upgrades to existing onsite storage is being designed, with construction to be completed in FY 1996. The current onsite storage areas will require upgrading in the future. The hazardous waste storage area will be upgraded in FY 1999, and the low-level waste storage area will be upgraded between FY 1997 and FY 2004.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Inhalation Toxicology Research Institute.

LANDLORD FUNCTIONS

The DOE's Office of Energy Research is the landlord for this site.

PROGRAM MANAGEMENT

The Inhalation Toxicology Research Institute has no separate funding for program management. All program management activities are performed within waste management and environmental restoration activities. This estimate employed a factor based on current and anticipated program management needs to create an independent cost category. Program and management activities at the site consume approximately 20 percent of the total budget.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Inhalation Toxicology Research Institute

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	339	109	109	109	109	109	93	5,237

* Costs reflact e five-yeer everega in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Totel Life Cycle is the sum of ennuel costs in constant 1995 dollars.

Nondefense Funding Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	503	0	0	0	0	0	0	3,016
Waste Management	499	438	438	438	438	438	373	15,805
Program Management	339	109	109	109	109	109	93	5,237
Total	1,340	547	547	547	547	547	466	24,052

* Costs reflect a five-year everage in constant 1995 dollars, except in FY 1995-2000, which is a six-year avaraga.

** Total Lifa Cycle is the sum of annual costs in constant 1995 dollars.

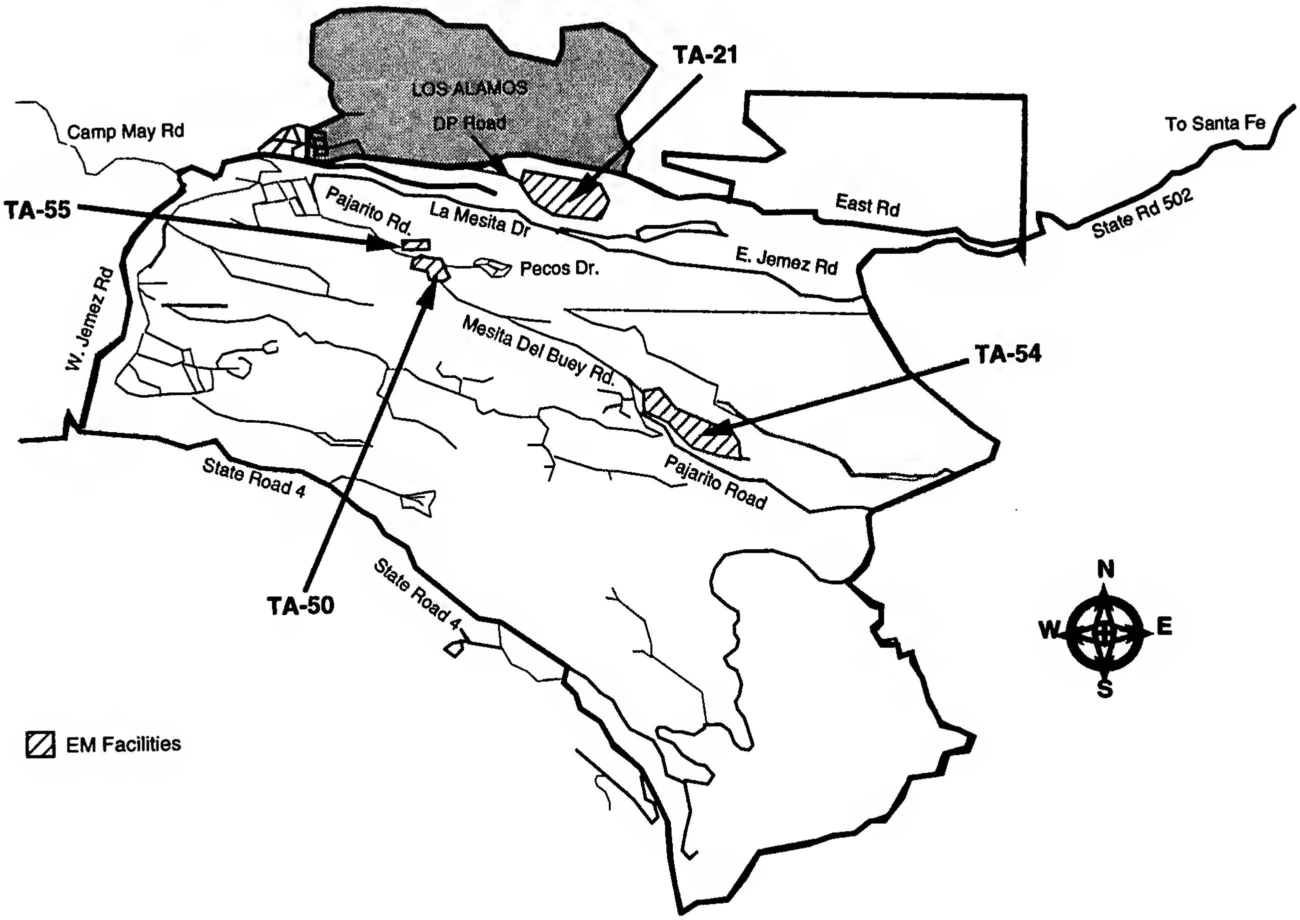
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE Fiscal Year
Environmental Restoration:		
	Diesel Oil Assessment Final Report	1995
	Remedial Action Plan Complete	1995
	Hot Pond Final Report	1995
	Groundwater Remedial Action Plan Complete	1995
	Sanitary Lagoons Assessment Fieldwork Complete	1995
	Sanitary Lagoons Assessment Results Complete	1995
	Sanitary Lagoons Remediation Complete	1996
	Lagoon and Groundwater Final Report Complete	1997
Waste Management:		
	Final Site Treatment Plan	1995
	Hazardous Waste Storage Area Upgrade	1999
	Low Level Waste Storage Area Upgrade	1997 - 2004
	All Waste Management Activities Complete	2035

For further information on this site, please contact: *Public Participation Office* *(505) 845-5951*
Public Affairs Office *(505) 845-6202*
Technical Liaison: Ted Pietrok *(505) 845-5649*

LOS ALAMOS NATIONAL LABORATORY

The Los Alamos National Laboratory occupies about 43 square miles in Los Alamos County, New Mexico. It is about 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe. The site lies on the Pajarito Plateau, which is made up of finger-like mesas ranging in elevation from 6200 to 7800 feet.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	72,160	88,880	85,040	85,040	93,760	98,800
Waste Management	59,160	60,960	76,960	72,240	78,240	74,880
Nuclear Material and Facility Stabilization	0	6,800	8,100	8,400	8,700	8,900
Program Management	32,830	32,260	40,500	39,100	43,000	43,420
Total	164,150	188,900	210,600	204,780	223,700	226,000

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	85,801	52,820	26,240	0	0	0	0	910,104
Waste Management	65,184	72,746	82,350	83,296	81,972	81,499	72,389	2,762,363
Nuclear Material and Facility Stabilization	10,693	4,655	4,703	182	0	0	0	111,854
Program Management	11,380	18,186	20,587	20,824	20,493	20,375	18,097	661,093
Total	173,057	148,407	133,880	104,302	102,465	101,874	90,486	4,445,415

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The Los Alamos National Laboratory was established in 1943 for the design, development, and testing of nuclear weapons. Supporting this mission were research programs in nuclear physics, hydrodynamics, conventional explosives, chemistry, metallurgy, radiochemistry, and biology.

In addition to research, an important function of the laboratory has been the processing of plutonium metal and alloys from the nitrate solution feedstock provided by other production facilities. The processing of plutonium metal continued from 1945 until 1978. Other operations included the reprocessing of nuclear fuel, polonium and actinium processing, and the production of nuclear weapons components.

Although the Laboratory's current mission remains focused on national defense, it has been broadened to include research in medium-energy physics, space nuclear systems, controlled thermonuclear fusion, lasers, nuclear safeguards, space physics, biomedicine, computational science, materials science, and environmental management. Because of its position between academic and industrial research, the Laboratory has an important role in expediting the development and commercialization of emerging technologies. This mission is expected to continue into the foreseeable future.

Current projections of land and facility requirements for the next 20 years indicate that the Laboratory needs to retain most of the 43 square miles of its site, either for structures, roads, utilities, firing sites, or for a buffer area for environmental research. However, the Department of Energy (DOE) is considering the transfer of up to 7,000 acres to the Los Alamos County for industrial and commercial use. These parcels are deemed to be in excess of programmatic needs.

The Laboratory's requirements for land will be reviewed by the recently established Future Site Use Integration Team, which, in consultation with the general public, will recommend transfer or retention for various parcels of land, particularly in the environmental research buffer area. The landlord for the Laboratory is Defense Programs.

ENVIRONMENTAL RESTORATION

Ever since the Laboratory was established, many of its operations required the use of hazardous chemicals and radioactive materials like plutonium and uranium. The use of these materials resulted in the contamination of facilities and, in some cases, of the surrounding environment. A major source of environmental pollution was the management of waste, which was discharged into water or air or buried in land disposal areas in accordance with standards in effect at that time. In addition to hazardous chemicals and radioactive materials, the contaminants of concern include explosive

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Field Unit 1	26,933	4,680	8,700	0	0	0	0	228,500
Field Unit 2	8,120	5,800	1,300	0	0	0	0	84,218
Field Unit 3	9,308	2,000	1,360	0	0	0	0	72,647
Field Unit 4	14,160	17,500	4,140	0	0	0	0	193,159
Field Unit 5	9,085	11,840	3,940	0	0	0	0	133,410
Field Unit 6	18,195	11,000	6,800	0	0	0	0	198,169
Total	85,801	52,820	26,240	0	0	0	0	910,104

* Costs raflact e five-yaar avaraga in constant 1995 dollars, axcept in FY 1995-2000, which is e six-year evarege.

** Totel Lifa Cycla is the sum of annual costs in constent 1995 dollars.

residues and asbestos. Asbestos, while no longer used, is generated as a waste during facility modifications and during decommissioning.

Environmental restoration has identified approximately 2,100 potential release sites. The primary mechanisms for the release of contaminants are the runoff of surface water that carries potentially contaminated sediments and the erosion of soil to exposure buried contaminants. The main pathways by which released contaminants can reach people living beyond the boundaries of the site are infiltration into alluvial aquifers and airborne dispersion of particulate matter.

To identify releases that could pose a health risk to surrounding communities, ground-water and air monitoring programs have been implemented. Limited data gathered so far indicate that risks to the health and safety of the public are minimal.

By the end of FY 1994, 50 of the approximately 2,100 potential release sites had been remediated, no further action was proposed for 300 sites, and 1,100 sites were slated for investigation or cleanup; for the remaining sites, action is still pending. All cleanup activities are expected to be completed by FY 2010.

Whenever warranted and possible, the expedited cleanup approach is used. This approach permits a site-specific remediation to be planned, designed, and implemented without proceeding through the entire corrective action process. For complicated actions, like remediating the former material disposal areas, environmental restoration will use the conventional corrective action process to evaluate exposures, compare alternatives, and prepare detailed plans and specifications for the action. Some sites may require interim actions before an expedited cleanup or final remediation. For these sites, the project will concentrate on removing the source of the contamination before investigating the final corrective measure.

Detailed funding requirements for environmental restoration activity are given in the Environmental Restoration Projects, and major activity milestones are presented in the milestones table at the end of this section.

Corrective actions and remedial designs will meet requirements of the Laboratory's Resource Conservation and Recovery Act (RCRA) operating permit and the U.S. Environmental Protection Agency (EPA) corrective action Hazardous and Solid Waste Amendment requirements of the RCRA operating permit. The State of New Mexico issued the RCRA permit but EPA retains authority over the Hazardous and Solid Waste Ammendment portion of the permit.

The potential release sites slated for further action have been combined into six field units for investigation and remediation.

Field Unit 1

Field Unit 1 consists of 664 potential release sites. It includes all of the Los Alamos County townsite potential release sites that are on land no longer owned by DOE. It also includes sites at the old plutonium-processing facility, those at the main technical area, and other sites at various technical areas. In addition, this field unit contains several of the Laboratory's old material-disposal areas as well as the Los Alamos municipal sanitary landfill. The primary potential contaminants of concern are radionuclides, volatile organic compounds, and inorganic compounds, including heavy metals.

Some of the early Laboratory sites included administrative buildings, laboratories, and research facilities, many of which handled radioactive and hazardous organic and inorganic substances. These areas were cleaned of radioactive material in the 1960's before

being released to the county of Los Alamos or sold to private owners. However, with the increasingly stringent laws governing hazardous waste, the areas are subject to reinvestigation and remediation as part of environmental restoration activities.

The main technical area of the Laboratory includes potential release sites associated with principal administration buildings, shops, warehouses, several large laboratory buildings housing diverse programs, and numerous smaller buildings serving specialized functions. Also included are the gas-fired electrical generation plant, gas station and garage, and sewage treatment plant.

Site characterization is under way across the entire field unit except for one area, which will begin site characterization in July 1997. Projected activities for FY 1995 include reporting to the EPA on investigations required by RCRA for 104 potential release sites; completing investigations at 46 sites; and completing cleanup at 17 sites. Remediation is to be completed by FY 2007.

Field Unit 2

Field Unit 2 consists of 301 potential release sites associated with 14 technical areas. This unit includes active and inactive firing sites, a facility for research on nuclear criticality, a 0.5-mile-long linear proton accelerator, and associated experimental research areas. The primary contaminants of concern are radionuclides, high explosives, organics, and heavy metals.

The inactive firing sites which were used starting in the early 1940's, were used for experiments involving explosive charges ranging from a few pounds to 2 tons. At one of the active firing sites, more than 30,000 test shots were performed, with an estimated 2,200 to 4,400 pounds of depleted uranium expended. All of the experiments were above ground detonations. The resulting waste products vary widely in terms of particle size, from fine dust to shrapnel. Larger pieces of shrapnel have traveled up to 3,000 feet. Metal pieces that were projected downward penetrated the ground to a depth of several yards. In other tests, projectiles were fired at targets. In some cases, the projectiles penetrated the target and were embedded into the adjacent canyon walls.

The nuclear criticality experiments were conducted in three separate buildings. In one of the buildings, mockup studies of fission reactors and studies of a plasma-core power reactor were also performed. This site remains active and is also used for the development of treaty-verification technology.

The 0.5-mile-long linear proton accelerator, still in operation, is used for basic research on subatomic particles, isotope production, and accelerator-technology development.

Site characterization is presently going on in all areas of the field unit except for two which are scheduled to begin characterization next year.

Projects scheduled for FY 1995 are the complete investigation of all material disposal areas; the first phase of sampling for 127 potential release sites; and a survey of all firing sites. In addition, the closure of surface impoundments at area TA-53 will begin, and 12 expedited cleanups are planned for completion. All interim actions are to be completed by FY 2003, and remediation will be completed by FY 2010.

Field Unit 3

Field unit 3 consists of 555 potential release sites associated with 10 technical areas. It includes old sites, where high explosives were developed and processed, initiators for nuclear weapons were tested, and reactor components were developed. The primary contaminants of concern are radionuclides, high explosives, volatile and semivolatile organics, polychlorinated biphenyls (PCBs), asbestos, pesticides, and herbicides.

Much of the contamination in this field unit resulted from operations established during World War II to develop, fabricate, and test explosive components for nuclear weapons. Various other facilities included areas for photofission experiments, a mortar impact area, an air-gun firing range and other gun-firing sites, a burning ground, laboratories, storage buildings, sumps, and material disposal areas. In many of the experiments, beryllium-containing weapons initiators were tested, and in some experiments uranium components were used. A high-pressure tritium facility was also in operation until 1990.

One site in this field unit was used to develop nuclear reactors for the propulsion of space rockets. Experiments included the structural testing of fuel elements made of uranium-loaded graphite, which were tested until they failed. The site was also used to develop methods for uranium-isotope separation and to test lasers for exciting uranium hexafluoride gas of various enrichments. Experimental solar buildings and solar ponds were built later; these ponds have since been converted to sanitary waste lagoons.

All sites in this unit are being characterized, except for one area which is scheduled to begin characterization next year. Projected activities for FY 1995 include completing phase I sampling at 26 sites and starting phase II sampling at one site. Field work is scheduled to begin at approximately 75 sites. All interim actions are to be completed by FY 2001, and remediation is to be completed by FY 2007.

Field Unit 4

Field Unit 4 consists of 260 potential release sites and 19 canyons on the Pajarito Plateau; a reactor site; and various heavily industrialized sites. The primary contaminants of concern are radionuclides, high explosives, volatile and semivolatile organic compounds, and inorganics, including heavy metals. Most of the contamination resulted from various operations dating from as early as 1944, and most contamination associated with such facilities as surface impoundments and disposal areas, experimental reactors, wastewater treatment and septic systems, aboveground and underground storage tanks, sanitary and industrial waste effluent lines, PCB transformers, firing sites, incinerators, chemical processing, and shops for machining radioactive materials.

The Pajarito Plateau is a system of finger-like mesas extending from the Jemez Mountains, with canyons between each mesa. Contamination may have occurred in 19 canyons from various Laboratory operations both on the mesas and within the canyons themselves. Many of the canyons extend beyond the current boundaries of the Laboratory and eventually drain into the Rio Grande in New Mexico. The environmental restoration activity will investigate any potential offsite contamination from potential release sites that discharge into the canyons.

Radioactive contaminants (primarily tritium, cesium 137, and strontium 90) have been detected in alluvial ground water downgradient of two sites located in one of the main canyons within the Laboratory's boundaries. One of the sites houses the Omega West Reactor. This reactor, no longer operational, was an 8-megawatt water-cooled reactor fueled with highly enriched uranium; it was used for basic research in nuclear physics. The other site was used in developing weapons-boosting systems and conducting long-term studies on weapon subsystems.

Site characterization is in progress across the field unit except for one area. Field activities projected for FY 1995 include completing phase I characterization for all remaining potential release sites. Interim actions and remediation will be completed in FY 2005 and 2010, respectively.

Field Unit 5

Field unit 5 consists of 312 potential release sites associated with several areas used for explosives development, primary waste management facilities, and one offsite area located on land owned by the U.S. Forest Service and leased by DOE. Many of the Laboratory's material disposal areas are also located within this field unit. The primary contaminants of concern are radionuclides, high explosives, volatile organic compounds, and metals.

Much of the contamination in this field unit resulted from high-explosives research and development and from testing at aboveground firing sites. Other contributors to contamination were research into various methods for assembling fissionable material to produce nuclear bombs and the testing, development, and production of bomb detonators.

This unit contains all of the Laboratory's retired and operating waste management facilities other than the very early landfills, which are part of field unit 1. One of the retired facilities sites, established in 1948, consists of several pits and shafts that contain a very diverse mixture of contaminants, including low-level, transuranic, hazardous, and mixed waste. Another landfill was established in 1974 to replace this historical site and continues to operate today. The Laboratory's radioactive landfill is also part of this field unit. Another buried material disposal area was used in the

Environmental Restoration Activity Costs

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Field Unit 1								
Assessment	17,130	2,740	0	0	0	0	0	116,483
Remedial Actions	9,803	1,940	8,700	0	0	0	0	112,018
Field Unit 2								
Assessment	6,882	240	0	0	0	0	0	42,491
Remedial Actions	1,238	5,560	1,300	0	0	0	0	41,726
Field Unit 3								
Assessment	7,922	1,660	0	0	0	0	0	55,830
Remedial Actions	1,386	340	1,360	0	0	0	0	16,818
Field Unit 4								
Assessment	14,160	5,000	900	0	0	0	0	114,459
Remedial Actions	0	12,500	3,240	0	0	0	0	78,700
Field Unit 5								
Assessment	7,847	740	0	0	0	0	0	50,784
Remedial Actions	1,238	11,100	3,940	0	0	0	0	82,626
Field Unit 6								
Assessment	14,061	0	0	0	0	0	0	84,365
Facility Decommissioning	4,134	11,000	6,800	0	0	0	0	113,804
Total	85,801	52,820	26,240	0	0	0	0	910,104

* Costs raflect a five-yeer average in constant 1995 dollers, axcept in FY 1995-2000, which is e six-yeer avarege.

** Totel Lifa Cycle is the sum of ennuel costs in constant 1995 dollers.

early 1960's and currently contains large amounts of various waste materials, including plutonium and lead. This unit also contains the Laboratory's liquid-waste treatment plant, built in 1963. The plant receives liquid waste from across the Laboratory, treats it to remove target contaminants, and monitors and then releases the treated liquid effluent through an approved outfall.

Located 37 miles west of the Laboratory, Fenton Hill, is a site for research on geothermal energy. Formerly operated by the Laboratory and now inactive, the site is located on land leased by DOE. A few potential release sites have been identified here.

Field activities projected for FY 1995 include extensive surveying and soil sampling, shallow boring and drilling, and the removal of three septic tanks. Remediation and any final interim actions are to be completed in FY 2007.

Field Unit 6

Field unit 6 covers activities related to decommissioning facilities that are no longer needed. Decommissioning is the removal of contamination and the actions taken to demolish facilities. When it is determined that a contaminated facility is no longer needed for its original purpose, the decommissioning program decontaminates the facility but does not demolish it if it can be used for another purpose. If the building cannot be used for another purpose, it is demolished.

The decommissioning projects include buildings from the former plutonium-processing facility (discussed as part of field unit 1), which was used from the late 1940's to the early 1970's; a phase separator pit used from the mid-1960's through the early 1990's; a former tritium facility used from the mid-1950's through the late 1980's; many abandoned buildings contaminated with high explosives and used from the 1950's to the 1980's; and the Omega West Reactor (discussed under field unit 4), which was used from the mid-1950's to the early 1990's.

As funding becomes available and other sites are identified as excess, the decommissioning project will decommission those buildings. The decommissioning project coordinates closely with the environmental restoration activity in identifying potential contaminants in and around buildings slated for decommissioning.

Activities for FY 1995 include a preliminary assessment of the Omega West Reactor; the complete characterization of filter buildings at area TA-21; and the start of the site characterization for other buildings. In FY 1996, work will continue at areas TA-21 and TA-16. In FY 1997, 25 buildings at area TA-21 will be decommissioned, and in FY 1999 the tritium facility at area TA-33 will be decommissioned.

WASTE MANAGEMENT

Ongoing activities and operations at the Laboratory continue to generate waste from processing effluents, separating isotopes, manufacturing, research and development programs in basic and applied chemistry, testing and manufacturing explosives, cleaning chemically contaminated equipment, and working with radioactive materials. Activities that generate waste are located in 33 technical areas at the Laboratory.

The waste types generated at the Laboratory include radioactive waste (transuranic waste and mixed transuranic waste, low-level radioactive waste and low-level mixed waste, and accelerator-produced radioactive materials); hazardous chemical waste; biological waste; medical waste; and sanitary solid and liquid waste. The Laboratory does not generate any high-level waste. Some spent nuclear fuel is kept in interim storage, but funding for its management is provided by Defense Programs, and spent fuel is, therefore,

not included in the activities described here. The facilities generating waste are responsible for ensuring that each type of waste meets the acceptance criteria for disposal. This entails determining the characteristics of the waste, packaging it, and labeling the packages.

The Laboratory has initiated an effort to minimize the generation of radioactive and hazardous chemical waste. To this end, it conducts applied studies as well as research and development on methods for reducing the volume of solid and liquid radioactive and hazardous waste. Waste minimization and pollution prevention should greatly reduce the volume of waste and the costs of its management.

Waste Treatment

The Laboratory has several facilities for the treatment of radioactive waste: the Radioactive Liquid Waste Treatment Facility, which services both liquid transuranic and liquid low-level waste; the Controlled Air Incinerator, which could potentially accept transuranic, and mixed waste; and the Waste Characterization, Reduction, and Repackaging Facility, which services solid transuranic waste.

The Radioactive Liquid Waste Treatment Facility consists of a primary chemical treatment and ion-exchange plant and a pretreatment plant for removing plutonium and other actinide elements from liquid transuranic waste. This facility, however, is 30 years old and is to be replaced with a new treatment facility designed to remove essentially all actinides (99.999 percent) from liquid transuranic waste. The new facility was expected to start operating in FY 2004, but because of funding problems, it is assumed for the purposes of this report that operation will start in FY 2009.

The Controlled Air Incinerator operated for nine years as part of a research and development program. Currently it is not operating because the off-gas system is being upgraded to improve reliability and reduce risks of environmental pollution. DOE is considering operating the Controlled Air Incinerator for routine waste treatment. Operation of the incinerator for routine waste treatment is dependent upon the development of incineration standards by the New Mexico Environmental Department and recommendations in the final site-wide environmental impact statement for the Los

Major Waste Management Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Controlled-Air Incinerator	5,133	4,680	4,680	4,680	4,680	4,680	4,680	171,200
Hazardous Waste Treatment Facility	833	0	0	0	0	0	0	5,000
High Explosives Waste Water Treatment	883	0	0	0	0	0	0	5,300
Mixed Waste Recovery and Storage	1,125	0	0	0	0	0	0	6,750
TRU Waste Remediation	4,833	2,800	200	200	400	0	400	49,000

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

NOTE: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

Alamos National Laboratory. A significant upgrade to the Controlled Air Incinerator facility is proceeding prior to a decision being made in the site-wide environmental impact statement whether to operate the Controlled Air Incinerator. If so, the incinerator will be used first to incinerate low-level mixed waste and then to incinerate newly generated and stored transuranic waste.

Mixed transuranic waste will require treatment to meet the Waste Isolation Pilot Plant Waste Acceptance Criteria. In the event the no migration petition variance is not approved, mixed transuranic waste will require treatment to meet RCRA Land Disposal Requirements. The Controlled Air Incinerator is being considered as an option for the conditional treatment of mixed transuranic waste to meet RCRA Land Disposal Restrictions.

The Laboratory expects to build a new treatment facility for solid transuranic waste.

Transuranic Liquid Waste

Transuranic liquid waste is radioactive waste contaminated with plutonium and other long-lived elements with atomic numbers higher than that of uranium in concentrations greater than 100 nanocuries per gram of waste. Because this waste will remain radioactive for many thousands of years, it requires disposal in a geologic repository (the Waste Isolation Pilot Plant near Carlsbad, New Mexico).

At the Laboratory, liquid transuranic waste is produced at the Los Alamos Plutonium Facility (TA-55), from where it is transported by a pipeline to the Radioactive Liquid Waste Treatment Facility at TA-50. This facility consists of a primary chemical treatment and ion-exchange plant and a pretreatment plant for removing plutonium and other actinides. The pretreatment plant has demonstrated that more than 99 percent of the actinides can be removed from the waste stream. Residual transuranic waste sludge remains after treatment. This sludge is loaded into 55-gallon steel drums, solidified, and transported to Area G for storage. The industrial pipeline that transports the liquid transuranic waste from the plutonium facility to treatment was recently replaced with a double-wall piping system.

Transuranic Solid Waste

The program for treating solid transuranic waste has the following objectives: characterizing existing transuranic waste to determine that it meets the criteria for acceptance at the Waste Isolation Pilot Plant; certifying that all newly generated transuranic waste meets these acceptance criteria; and reducing the volume of the waste, stabilizing the waste, and repackaging it. Most of these functions will be performed at the Waste Characterization, Reduction, and Repackaging Facility.

The Waste Characterization, Reduction, and Repackaging Facility was originally designed to repackage and reduce the volume of metallic waste gloveboxes, process equipment, and conduct work. This facility is being modified to perform waste characterization. The modifications consist of installing a glovebox in which the contents of waste drums can be removed and installing a glovebox for characterizing the contents of waste drums.

Future plans are to develop a new facility for characterizing and processing transuranic solid waste. The new facility will have the capability of repackaging, stabilizing, and characterizing contact handled transuranic waste, which is characterized by low levels of radiation at the surface of the drum, and accounts for most of the transuranic waste. Remote handled transuranic waste, which has relatively high levels of radiation at the surface and must be handled by remote control. This facility will use chemical reactors, induction furnaces, microwave smelters, and plasma-arc furnaces to treat the waste. Phase I is expected to be fully operational by FY 2006 and phase II by FY 2009.

Transuranic Mixed Waste

Transuranic mixed waste contains both long lived transuranic radionuclides and chemically hazardous constituents. The need for treating this waste and the degree of treatment will be driven by the waste acceptance criteria for the Waste Isolation Pilot Plant, which is expected to start receiving waste in FY 1998.

The construction of a new Transuranic Waste Treatment Facility is planned for FY 2003. However, for purposes of this report, it is assumed that the construction of this facility will be delayed to FY 2009. This means that the Laboratory may not be able to start timely shipments of transuranic mixed waste that requires treatment to meet the Waste Isolation Pilot Plant Waste Acceptance Criteria. The Controlled Air Incinerator and the Waste Characterization, Reduction, and Repackaging Facility are potential options for the treatment of transuranic mixed waste.

Low-Level Liquid Radioactive Waste

One of the treatment facilities for low-level liquid waste is the primary chemical treatment and ion-exchange plant at the Radioactive Liquid Waste Treatment Facility. The chemical treatment separates actinides and other radionuclides from the plant influent waste stream. The liquid waste is transported from the Los Alamos Plutonium Facility in an industrial pipeline that has recently been upgraded. The residual radioactive sludge remaining after treatment is loaded into drums, solidified, and transported to Area G for disposal.

Low-Level Solid Radioactive Waste

Low-level solid radioactive waste is currently not treated at the Laboratory. However, a two-ton compactor is expected to become operational in 1995.

Low-Level Mixed Waste

As a result of the land disposal restrictions of RCRA, the Laboratory is striving to develop capabilities to treat the low-level mixed waste currently in storage. It is proposed that combustible low-level mixed waste will be treated in the Controlled Air Incinerator if the decision from the Environmental Impact Statement is for operation. A schedule for working off the entire inventory of low-level mixed waste in storage will then be established in an agreement with EPA.

To treat low-level mixed waste that is not incinerated as well, as investigate potentially more efficient alternative, the Department plans to develop the Hazardous Waste Treatment Facility. This facility will have four treatment rooms and a metal building for drum storage. The treatment equipment will be skid-mounted to allow multiple uses and multiple treatments for a variety of waste. Several mobile treatment units are being developed to support part of this project. These units will require upgrading after 12 years of use. Processes needed for waste not currently addressed will be developed systematically. Construction will be completed in FY 1998.

Another facility that will have the capability to treat mixed waste will be the Mixed Waste Disposal Facility. As currently planned, it will be used primarily to treat waste generated by environmental restoration as well as decommissioning. The treatment facilities will include a plant for treating leachate wastewater, a thermal desorption plant, and a plant for stabilizing metals. These facilities are planned for completion by FY 2004, FY 2009, and FY 2009, respectively.

Hazardous Chemical Waste

Nearly all of the Laboratory's chemical waste is treated at commercial offsite facilities, but the Laboratory does perform volume reduction for some waste (e.g., crushing scintillation vials) and treatment of barium sands. In the future

these hazardous wastes, which cannot be handled by commercial facilities, will be treated at the Hazardous Waste Treatment Facility to be developed, and other undetermined offsite locations.

High-Explosives Wastewater

High-explosives wastewater is treated by gravity settlement in a sump and then discharged from outfalls operated with permits under the National Pollutant Prevention Discharge Elimination System. Initially, there were 21 such outfall discharges from widespread technical areas that process high explosives. Waste minimization efforts have reduced the number of outfalls from 21 to 2.

Dissolved constituents are not removed by this treatment. As a result, there are often compliance issues associated with the National Pollutant Prevention Discharge Elimination System permit. The Laboratory is under an administrative order from EPA to treat all high-explosives wastewater by FY 1997 and has agreed to this requirement. To meet this obligation, the Laboratory is developing a high-explosives wastewater treatment facility that will collect and treat these wastewaters with stepped filtration. The ultimate goal for this facility is zero discharge with complete recycling of the system water. Construction is scheduled for completion in FY 1997.

Sanitary Waste

Liquid sanitary waste is treated by a consolidation and collection system, which replaced eight existing wastewater-treatment facilities and 30 septic tanks. This new facility provides state-of-the-art treatment and a laboratory for analyzing both the process and the effluent streams. It is expected to meet all Laboratory needs for the next 20 years.

Solid sanitary waste will be managed and disposed of at the Laboratory's site until 2003, after which the waste will go to a regional commercial disposal facility.

Waste Storage

Transuranic Solid Waste and Transuranic Mixed Waste

The Laboratory currently stores transuranic solid waste in five configurations in Area G. Transuranic solid waste generated before 1979 is stored in belowground arrays in pits and trenches at Area G, while waste generated from 1979 to 1991 was placed in "bermed" storage, a method of storing on asphalt pads in dense-pack arrays under earthen cover. Waste generated after 1991 is stored in tension-support fabric domes in arrays that can be inspected, as required by RCRA. Remote-handled transuranic waste, which requires storage with radiation shielding, is kept in canisters lowered into shafts at Area G.

In January 1993, the State of New Mexico issued a compliance order to the Laboratory to bring the bermed-stored transuranic waste to complete compliance with RCRA. In order to comply with this order, the Laboratory initiated the Transuranic Waste Inspectable Storage Project. The objective is to retrieve the waste stored under earthen cover at Pads 1, 2, and 4 at Area G and place it into inspectable storage. The project consists of four phases. The project requires the construction of a retrieval dome and two storage domes. The first phase of construction is to be completed in June 1995, and the project is scheduled for completion in FY 2002.

Low-Level Mixed Waste

Low-level mixed solid and liquid waste are presently segregated, packaged, and stored at the Radioactive Storage and Disposal Facility in Area G (solids) and Area L (liquids) in inspectable arrays under tension-support fabric domes. The present storage capacity is inadequate for supporting the Laboratory's upcoming treatment facilities, specifically the Hazardous Waste Treatment Facility and the Controlled Air Incinerator. The Laboratory has,

therefore, initiated the development of the Mixed Waste Receiving and Storage Facility, which will be adjacent to the Hazardous Waste Treatment Facility. The facility will be a high-bay structure, with three segregated areas for mixed-waste handling, segregation, staging, and storage. The largest storage area will hold nonflammable mixed waste. The second area will store flammable mixed waste, and the third area will be used for repackaging, bulking, and preparing liquid and solid mixed waste for incineration. Construction is anticipated to be completed in FY 1998.

Low-level mixed waste generated by environmental restoration activity will require storage until all components of the Mixed Waste Disposal Facility are completed in FY 2009. It is estimated that 50,000 cubic meters of low-level mixed waste will be generated before this facility opens. If necessary, the laboratory would store this waste in self-supporting fabric domes. All storage facilities will have RCRA permits.

Hazardous Chemical Waste

Hazardous chemical waste is stored at Area L in storage sheds with RCRA permits. This facility will continue to package, bulk, and prepare hazardous chemical waste for offsite treatment and disposal for the foreseeable future. There are currently no plans to replace this facility because the Laboratory expects generation rates to start decreasing with the implementation of very stringent waste minimization and pollution prevention programs.

Waste Disposal

Transuranic Solid Waste

The Laboratory's transuranic waste is destined for disposal in the Waste Isolation Pilot Plant, which is expected to open in 1998. The exact date for shipping transuranic waste from the Laboratory is unknown at present. However, the Laboratory is pursuing plans to certify as much waste as possible by the 1998 opening date of the Waste Isolation Pilot Plant.

Low-Level Solid Waste

Low-level solid waste, mainly trash contaminated with transuranic elements at concentration of less than 100 nanocuries per gram, has been landfilled since 1957 in shafts and large pits at Area G, the Radioactive Disposal and Storage Facility. The shafts are 1 to 12 feet in diameter and up to 65 feet deep and may be lined or unlined. They are used for waste requiring special handling or more containment than that provided by burial in pits; examples are waste contaminated with tritium, mixed fission products and mixed activation products, highly activated pieces of equipment, solids contaminated with PCBs, animal tissue, beryllium, graphite powders, and high-efficiency particulate air filters not meeting the particulate requirements for disposal in pits.

The current disposal facility has a remaining capacity of 22,000 cubic meters. At current operational generation rates and implementation of waste minimization, Area G has an operational life of 10 years. However, if environmental restoration activity cleanups are accelerated as presently planned, Area G will reach its useful design life by the end of FY 1997. The expansion of Area G is pending and dependent on decisions made in conjunction with the site-wide environmental impact statement. As an alternative to the expansion of Area G, the Laboratory is exploring other options for the disposal of low-level waste in the future (e.g., the Nevada Test Site).

Low-Level Mixed Waste

The Mixed Waste Disposal Facility, planned for completion in FY 2009, will provide approximately 12 acres of disposal area for up to 363,200 cubic meters of mixed waste. Most of the waste proposed for disposal at this facility will be soil and debris.

Hazardous Chemical Waste

Hazardous chemical waste is shipped offsite for disposal in facilities with RCRA permits. This arrangement will continue for the foreseeable future.

Administratively Controlled Waste

Administratively controlled waste is waste not regulated by RCRA and TSCA, but is deemed by the Laboratory to be inappropriate for disposal at the Los Alamos County Sanitary Landfill site. Examples are classified computer equipment and magnetic tapes or any wastes controlled for national security purposes. These wastes are disposed of in the Area J Landfill at Technical Area 54. Future plans for disposal will depend on the future strategy for sanitary waste disposal. If the Laboratory sites a new sanitary landfill, these wastes will be disposed at the new facility. If not, an alternative site will be identified when Area J reaches capacity.

Sanitary Solid Waste

Sanitary solid waste generated by the Laboratory is currently disposed of at the Sandia Canyon site (Technical Area 61) on East Jemez Road. Owned by DOE, this site serves the landfill needs of both the Laboratory and of Los Alamos County. The County has operated this landfill under a Special Use Permit from DOE since 1971.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Transuranic Waste	8,202	12,064	12,064	12,064	10,833	10,363	10,363	387,977
Low-Level Mixed Waste	12,879	9,160	9,731	8,748	8,671	8,671	8,671	345,528
Low-Level Waste	585	1,082	1,082	1,082	1,082	1,082	1,082	35,967
Storage and Handling								
Transuranic Waste	3,316	3,954	3,192	3,192	3,192	3,192	3,013	118,572
Low-Level Mixed Waste	1,217	1,200	1,157	1,157	1,157	1,157	1,023	41,563
Low-Level Waste	1,139	1,319	1,142	1,142	1,142	1,142	1,006	41,303
Disposal								
Low-Level Mixed Waste	20	158	340	378	361	359	327	9,739
Low-Level Waste	1,157	8,919	18,664	20,646	20,646	20,646	18,994	549,519
Hazardous Waste	10,877	10,351	10,437	10,348	10,348	10,348	8,278	365,814
Sanitary Waste	2,837	2,699	2,699	2,699	2,699	2,699	2,159	95,298
Other								
Waste Management TSD	22,956	21,840	21,840	21,840	21,840	21,840	17,472	771,093
Total	65,184	72,746	82,350	83,296	81,972	81,499	72,389	2,762,363

* Costs reflact a five-yaar averege in constent 1995 dollars, except in FY 1995-2000, which is a six-yeer everege.

** Totel Life Cycle is tha sum of ennuel costs in constent 1995 dollars.

The existing sanitary landfill is expected to reach the end of its useful life by 2003. At that time, either a new landfill will have to be constructed or provisions made for offsite disposal. The Laboratory is at present planning the construction of a new sanitary landfill at TA-49 East as the preferred option for the long-term disposal of sanitary solid waste. For purposes of this report, completion of the sanitary landfill is assumed to be FY 2004.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The facility stabilization and maintenance process began at the Los Alamos National Laboratory in 1995. There are 45 Los Alamos facilities slated to undergo this process. Thirty-five facilities have already begun stabilization and include an accelerator building, four laboratories, a cooling system building and numerous storage facilities. It is assumed for the purposes of this report that the remaining 10 facilities, which include a laboratory, a contaminated surge tank, drainage basins and a contaminated waste pit, will begin in 1996. The resulting waste types will include: hazardous, high-level, transuranic, low-level, and low-level mixed. This report arbitrarily assumes that the stabilization and maintenance process at the Los Alamos National Laboratory will be completed by the year 2013.

LANDLORD FUNCTIONS

Defense Programs is the landlord for the laboratory. Costs for environmental management activities are burdened at a rate to set apart landlord activities. Landlord and infrastructure charges are applied to waste management and environmental restoration through a fiscal-year facility space tax per square foot. The charges can be broken down into the categories of unmetered utilities, maintenance (janitorial services, electrical services, roof building, general building maintenance, custodial services, waste services, snow removal, and parking lots), and operations (oversight of space).

Nuclear Material and Facility Stabilization Cost Estimate

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	10,693	4,655	4,703	182	0	0	0	111,854

* Costs reflect e five-year everege in constant 1995 dollars, axcept in FY 1995-2000, which is e six-yeer average.

** Totel Life Cycle is the sum of ennuel costs in constent 1995 dollers.

PROGRAM MANAGEMENT

Program management represents cross-cut activities associated with all waste types and not directly in support of specific operations or projects. It provides overall support and direction for ongoing environmental remediation and for waste treatment, storage, and disposal activities at the Laboratory. In addition to program management (i.e., the planning and management of resources and information to accomplish project goals, budgets, and schedules) and facility management (the care, maintenance, and replacement of existing facilities and facility-related equipment), it includes activities like quality assurance; personnel training; document development and control; records and data management; financial planning and project controls; analytical support for waste management and environmental restoration; and waste minimization and pollution prevention. Future direction (e.g., deciding on new facilities and processes) and special projects are also included.

An important function of program management is providing health and safety oversight for all waste management and environmental restoration activities. This includes monitoring effluent streams and environmental media (e.g., biota and ambient air) in the vicinity of waste management facilities and environmental restoration projects. Other tasks include maintaining safety programs and supporting safety functions for occupational and chemical safety, radiological and radiation safety, and emergency response.

One major activity is related to regulatory compliance. It includes obtaining environmental permits; enforcing, monitoring, and tracking compliance; and activities mandated by various compliance orders and compliance agreements. This activity also includes the tracking and monitoring of progress for milestones mandated by the agreement under the Federal Facility Compliance Act. A more detailed description of the regulatory function and the regulatory protocols for environmental restoration and waste management is given in the introduction to this volume.

Finally, program management is responsible for providing opportunities for stakeholder involvement and public participation. Tasks include conducting tours of waste management or environmental restoration facilities and operations; preparation for, and participation in, public meetings; meetings with stakeholders; the preparation of responses to written inquiries from stakeholders; and the preparation of public information materials.

Program management services are tracked and charged through the budgets for waste management and environmental restoration activities. For the purposes of this report, 20 percent of the site's budget has been allocated for program management activities for FY 1995 - 2000. Program management costs for environmental restoration activities after FY 2000 are included within the environmental restoration scope.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Los Alamos National Laboratory.

Program Management Cost Estimate

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	11,380	18,186	20,587	20,824	20,493	20,375	18,097	661,093

* Costs reflect a five-year average in constent 1995 dollars, except in FY 1995-2000, which is e six-yeer everage.

** Total Life Cycle is the sum of annuel costs in constant 1995 dollars.

Defense Funding Estimate

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	85,801	52,820	26,240	0	0	0	0	910,104
Waste Management	60,868	72,746	82,350	83,296	81,972	81,499	72,389	2,762,363
Nuclear Material and Facility Stabilization	10,693	4,655	4,703	182	0	0	0	111,854
Program Management	11,380	18,186	20,587	20,824	20,493	20,375	18,097	661,093
Total	146,042	148,407	133,703	104,120	102,465	101,874	90,486	4,445,415

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is e six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

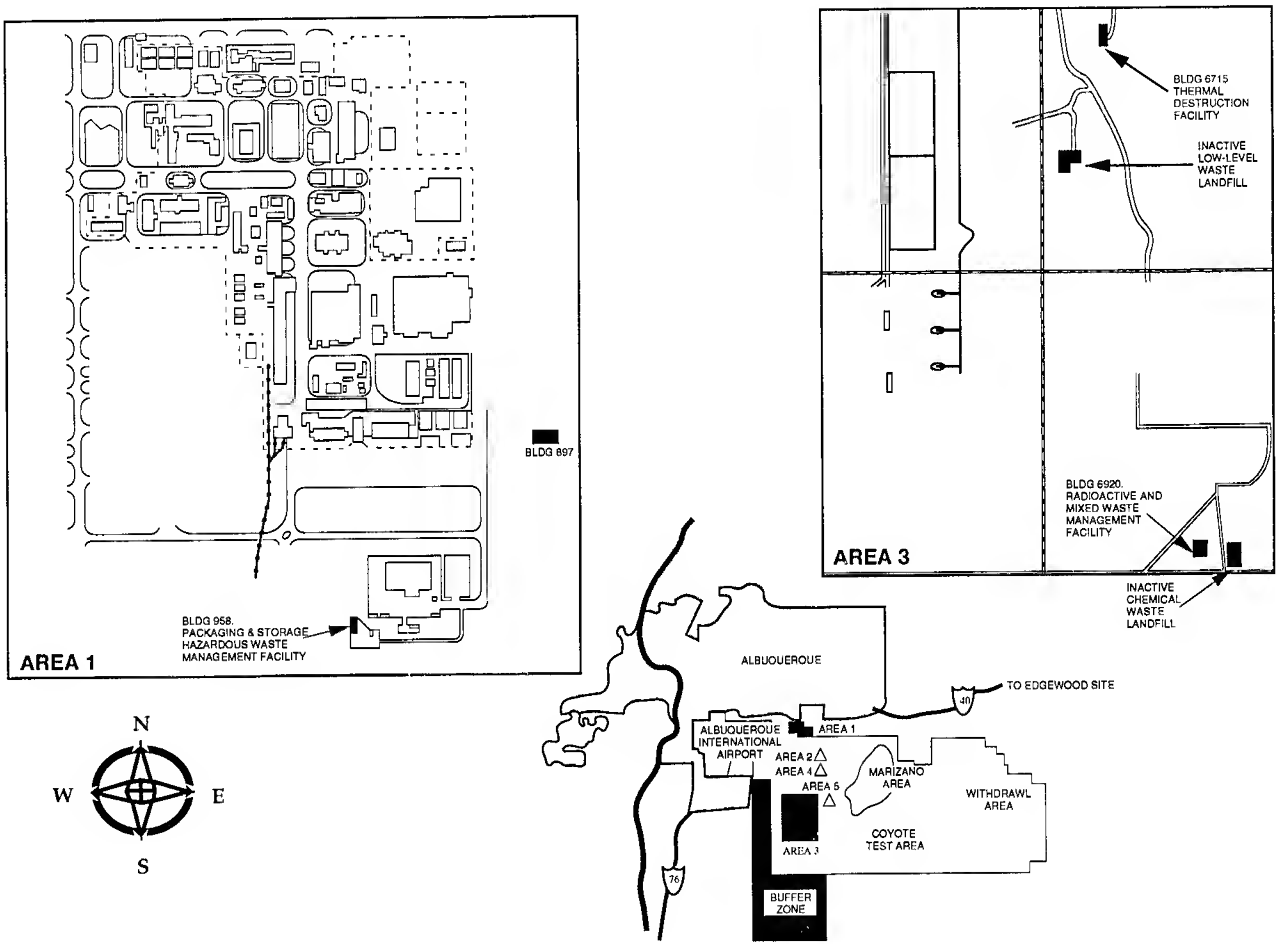
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Field Units 1,2,3,5 Assessment Completed	2005
	Field Unit 4 Assessment Completed	2010
	Field Unit 6 Assessment Completed	2000
	Field Unit 1,2,3,4,5,6, Remediation	2010
Waste Management		
	Complete Construction of the Hazardous Waste Treatment Facility	1998
	Complete Construction of the High Explosive Wastewater Treatment System	1997
	Complete Construction of the Mixed Waste Receiving and Storage Facility	1998
	Submit final Federal Facility Compliance Act Site Treatment Plan to New Mexico Environment Department	1995
	Start Operation of the Hazardous Waste Treatment Facility	1999
	Certification of Compliance for Transuranic Waste	2003
	Complete Construction of the Industrial Waste System	1995
	Complete Low-Level Mixed Waste Work-Off Plan for the Hazardous Waste Treatment Facility	1997
	Start Operation of the Mixed Waste Disposal Facility	1999
	Waste Management Activities Completed	2040

For further information on this site, please contact:	*Public Participation Office*	*(505) 845-5951*
	Public Affairs Office	*(505) 845-6202*
	Technical Liaison: Ted Taylor	*(505) 665-7203*

SANDIA NATIONAL LABORATORIES/NEW MEXICO

Sandia National Laboratories/New Mexico occupies several parcels of land covering 2820 acres at the Kirtland Air Force Base directly south of Albuquerque, New Mexico.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	23,295	19,734	24,766	22,432	22,295	19,931
Waste Management	12,537	13,296	19,279	21,801	21,155	25,426
Nuclear Material and Facility Stabilization	2,600	2,610	2,610	2,610	2,610	2,610
Program Management	7,780	7,271	9,716	9,857	9,713	10,081
Total	46,212	42,911	56,371	56,700	55,773	58,049

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	20,555	10,631	10,448	2,090	513	61	0	242,047
Waste Management	17,383	20,476	20,485	20,514	20,644	20,489	17,173	703,203
Nuclear Material and Facility Stabilization	2,610	2,598	2,151	105	0	0	0	39,924
Program Management	8,462	9,195	7,971	5,698	5,161	5,122	4,293	237,971
Total	49,009	42,900	41,056	28,407	26,317	25,672	21,467	1,223,145

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Sandia National Laboratories/New Mexico was established to conduct research and development in the interests of national security, with emphasis on nuclear weapon development and engineering. Sandia has evolved into a multi-program Laboratory with expertise in a broad range of scientific and technical fields, including fundamental energy research, energy conservation and renewable energy, nuclear reactor safety and reliability, nuclear waste management, and magnetic-confinement fusion. Recent mission changes have resulted in a decline in weapons research and development and an increase in work on nuclear safeguards and security, environmental sciences, and the transfer of technologies to private industry. Sandia will continue to pursue its defense and nondefense mission for the foreseeable future.

Defense Programs is the landlord for the Sandia site and will continue to use the property in support of its missions. Any unused land will be returned to the Department of Defense with continued restricted access (i.e., military and industrial use).

ENVIRONMENTAL RESTORATION

Environmental contamination at Sandia occurred from a wide variety of activities. The principal sources included firings conducted over many years to test weapons and weapons components; discharges of radioactive liquids and hazardous chemicals into the environment; oil spills; disposal of radioactive waste and hazardous chemicals in landfills; rocket launches; and burning of certain waste, such as high explosives. The contaminated facilities range from reactors to artillery ranges to scrap yards.

The assessment of environmental contamination at Sandia's site began formally in 1984, when the Department of Energy (DOE) started to identify, assess, and remediate potentially hazardous waste sites in response to the Comprehensive Environmental Response, Compensation and Liability Act. This program identified 117 sites with potential contamination. A similar investigation was conducted by the U.S. Environmental Protection Agency in 1987. These programs ultimately defined a working inventory of potential "solid waste management units." Current investigations are intended to determine the nature and extent of hazardous and radioactive contamination and to restore any sites where such materials pose a threat to human health or the environment.

For this report, contaminated sites at Sandia are grouped into four geographical areas: North Technical Areas, South Technical Areas, firing ranges, and the Thunder Range. Sandia is also responsible for two offsite areas: Kauai and Salton Sea. In addition, a group of site-wide activities has been established.

North Technical Areas

These areas include Technical Areas I and II and seven buildings which require decommissioning. Technical Area I, which contains office buildings and laboratories and houses most of Sandia's staff, has been in existence since 1945. It contains 15 environmental restoration sites, including a motor pool, a tank farm, a waste oil tank, a

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Facility Decommissioning	0	0	0	1,005	251	0	0	6,279
Firing Ranges	5,184	2,099	1,984	206	0	0	0	52,542
North Tech Areas	6,077	3,138	3,108	323	0	0	0	69,305
Offsite	695	60	0	0	0	0	0	4,466
Site-wide Activities	1,901	15	0	0	0	0	0	11,483
South Tech Areas	3,245	3,261	3,315	345	261	61	0	55,683
Thunder Range	3,454	2,059	2,042	212	0	0	0	42,290
Total	20,555	10,631	10,448	2,090	513	61	0	242,047

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

reclamation yard, a wastewater treatment plant, an acid-waste sewer line, and miles of sanitary sewer lines. Potential contaminants include petroleum hydrocarbons, polychlorinated biphenyls (PCBs), heavy metals, radionuclides, and organic compounds. Initial soil sampling indicates that contaminants like petroleum-fuel hydrocarbons and heavy metals are restricted to the soils above the water table. The depth to ground water is about 480 feet.

Technical Area II is an active 43-acre explosives-testing facility. Potential sources of contamination include a chemical disposal pit; a radioactive-waste landfill; a classified-waste landfill; seven septic systems; a storage yard for radioactive materials; a decommissioning site and uranium-calibration pits; firing sites; and an explosives-burn pit. Sampling to date indicates contamination with volatile and semivolatile organic compounds, high-explosives compounds, PCBs, and radionuclides, but the contamination is restricted to the soils above the water table. The depth to ground water is about 300 feet.

Preliminary site characterization has been conducted in both technical areas. Four uranium calibration pits were removed at Technical Area II in 1994. Future activities will include completing characterization (including surface and subsurface geophysical and environmental investigations); conducting voluntary corrective measures at Buildings 838 and 839 in Technical Area I; conducting voluntary corrective measures at site 114 in Technical Area II, and conducting remediation.

The North Technical Areas contain seven buildings that could pose a risk to human health and the environment: Building 863 in Technical Area I and Buildings 901, 906, 907, 919, 935, and 940 in Technical Area II. These buildings will be decommissioned.

South Technical Areas

This group includes Technical Areas III and V, the chemical waste landfill, the mixed waste landfill, and the liquid waste disposal system.

Technical Areas III and V, which cover about 1,920 acres, have been the site of nuclear and nonnuclear weapons testing since 1953. These areas contain 20 active and inactive environmental restoration sites, including burial sites, oil spills, sump and drain releases, two rocket sled tracks, and storage and salvage yards. Sampling to date indicates the presence of contamination with volatile organic contaminants, semivolatile organic contaminants, metals, high-explosives compounds, PCBs, and radionuclides. The contamination is restricted to the soils above the water table. Depleted uranium is scattered along both rocket sled tracks, but it was removed from the short sled track in October 1994.

At the chemical waste landfill, which covers about 1.9 acres, approximately 20,000 cubic yards of chemical and hazardous waste were buried in unlined pits and trenches from 1962 to 1985. The depth to ground water is about 500 feet. The chlorinated solvent trichloroethylene has been found in ground water at levels slightly above detection limits. Chromium has been detected also, but it may be a natural constituent of the ground water.

At the mixed waste landfill, which covers about 2.6 acres, approximately 3,700 cubic yards of low-level radioactive waste was buried in unlined pits and trenches from 1959 to 1988. The depth to ground water is about 500 feet. Contamination from volatile organic compounds and tritium is restricted to the soils above the water table.

The liquid waste disposal system, which consists of a below grade drain field, three holding tanks, and two surface impoundments, received radioactive discharge water from the Sandia Experimental Reactor Facility between

1963 and 1971. The radioactive elements in the discharge water were short-lived activation products in the water used to cool the reactor. Extensive sampling of ground water and soils shows the presence of radioactivity, but the radiation level is not higher than that of natural background. At one of the surface impoundments, PCBs are present in sludge. The chlorinated solvent trichloroethylene has been found in ground water near the liquid waste disposal system at levels slightly above detection limits.

Preliminary site characterization has been completed. A voluntary corrective measure under way at the gas cylinder disposal pit involves the removal of gas cylinders, thermal batteries, and various debris. Future activities in the South Technical Areas will include the completion of characterization (including surface and subsurface geophysical and environmental investigations), voluntary corrective measures at chemical waste landfill 75, and remediation.

Firing Ranges

The sites of concern at the firing ranges are the septic tanks and drain fields and the Foothills, Canyons, and Central Coyote Test Areas.

Twenty-three environmental restoration sites have been identified for the 42 separate septic and drainage systems scattered across the Sandia site. These systems were used mainly for liquid and sanitary waste and are currently being evaluated for chemical contamination. They received waters from facilities conducting weapons components tests from 1958 to 1991. Potential contaminants, most likely restricted to the soils above the water table, include radionuclides, solvents, high-explosives compounds, metals, and photochemicals. The depth to ground water probably varies from 50 to 500 feet.

The Foothills Test Area, which consists of 10 inactive environmental restoration sites, has been used for field testing since the late 1950's. A wide range of contaminants, including organic compounds, metals and high-explosives materials, and radionuclides may be present. The depth to ground water across the area probably varies from 50 to 100 feet.

The Canyons Test Area consists of 14 environmental restoration sites (9 active, 5 inactive) and 4 proposed sites. Some of these sites are still used; they are scattered over several thousand acres in three large canyons in the Manzanita Mountains at the eastern end of the Kirtland Air Force Base, on land withdrawn from the U.S. Forest Service. Potential sources of contaminants include burn sites, rocket-launch sites, dumps, and a surface impoundment. Principal contaminants probably include depleted uranium, metals, jet fuel, and other organic compounds. The depth to ground water is estimated to vary across the area from 50 to 100 feet.

The Central Coyote Test Area contains 14 inactive sites that include six test sites, two burn sites, an artillery range, a trash dump, a borrow pit, two scrap yards, and an unstaffed seismic observatory. The principal contaminants probably include high-explosives compounds, metals, jet fuel, radionuclides, volatile organic compounds, and asbestos. The depth to ground water across the area is estimated to vary from 50 to 100 feet.

Preliminary site characterization has been conducted. Future activities at the firing ranges will include the completion of characterization (including surface and subsurface geophysical and environmental investigations), voluntary corrective measures, and remediation. Voluntary corrective measures will be carried out at the following sites: septic tanks and drain fields; sites 58 and 8, Building 9990, and the TRUPAK "boneyard" (a storage area for the remnants of the TRUPAK transportation casks for transuranic waste that were subjected to

various destructive tests) in the Foothills Test Area; sites 10 and 60 in the Canyons Test Area; and sites 11, 47, 57B, 68, 21, and 22 in the Central Coyote Test Area.

Also present in the firing-range group is a corrugated-metal burn structure in Lurance Canyon. This structure will be decommissioned, like the seven sites discussed above, under the Technical Areas North.

Thunder Range

Thunder Range includes projects in the Tijeras Arroyo and the Southwest Test Area. The Tijeras Arroyo has 17 environmental restoration sites (7 active, 10 inactive) distributed over several miles of the arroyo and its tributaries that together drain thousands of acres of the Kirtland Air Force Base and the Sandia site. The main channel, approximately 100 feet deep and 1 mile wide in some places, empties into the Rio Grande less than 2 miles from the Sandia site boundary. A wide range of contaminants like metals, radionuclides, and organic compounds may be present. The depth to ground water is estimated to be about 500 feet.

The Southwest Test Area contains 24 environmental restoration sites (11 inactive, 13 active) and has been used for field testing explosives since the 1960's. A wide range of contaminants such as metals, high-explosive compounds, radionuclides, and organic compounds may be present. The depth to ground water is about 500 feet.

Preliminary site characterization has been conducted. Future activities include the completion of characterization (including surface and subsurface geophysical and environmental investigations), voluntary corrective measures, and remediation.

This project seeks to integrate regional, rather than site-specific, geologic and hydrologic information into a regional hydrogeologic framework for all the environmental restoration sites distributed across the Kirtland Air Force Base and the Sandia site. This project does not include responsibility for characterizing or remediating individual environmental restoration sites.

Offsite Areas

The Kauai Test Facility is located on the western coast of the island of Kauai in Hawaii within the Navy's Pacific Missile Range Facility. The 182-acre site is operated by Sandia National Laboratory/New Mexico and supports the Department's research and development activities, including rocket launches of nonnuclear payloads. Since the mid-1970's the Kauai Test Facility has been in operation, conducting an average of three or four tests per year. Contamination is suspected in three potential release sites that include the rocket launch pads, a drum storage area, and a photography laboratory. In 1994, sampling was conducted to determine the extent of contamination. Based on the results of these samples, Sandia National Laboratory/New Mexico plans to submit a request to the Environmental Protection Agency-Region X for approval of a no-further-action-decision.

Salton Sea Test Base (located in Imperial County, California) was used for Atomic Energy Commission/Sandia National Laboratory test activity from the mid-1940's through the early 1960's. Test activity in these years contributed to environmental contamination at some 23 sites within Salton Sea Test Base. The test base, which is currently in the Site Inspection phase of the CERCLA process, is also the subject of accelerated base realignment and closure activity to return properties to local communities.

The Sandia Offsite Areas also include one building at Holloman Air Force Base (near Albuquerque) where laboratory activities generated a variety of wastes.

Costs

The Estimated Site Total table gives estimated costs for site characterization, remediation, and waste disposal. Remediation costs for the North Technical Areas, South Technical Areas, firing ranges, and Thunder Range are based on the assumptions that, as indicated by currently available information, there is no ground-water contamination and that the standard for remediating each of the sites is future residential use. Assumptions about future land use control the extent of remediation and the volumetric estimate of contaminated soil. More detailed estimates of costs for various waste management activities are given in the Waste Management Activity Costs table at the end of this summary.

Treatments based on commercially available technologies were chosen for each of the contaminant scenarios listed below (the specified treatments are not intended to provide the maximum volume reduction possible).

- For hazardous chemicals only (metals or organics): clearing and grubbing, followed by excavation and landfill disposal.
- For radionuclides and metals: clearing and grubbing, followed by excavation, soil washing, and landfill disposal.
- For radionuclides and organics or radionuclides with metals and organics: clearing and grubbing, followed by excavation, low-temperature thermal desorption, soil washing, and landfill disposal.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Facility Decommissioning								
Facility Decommissioning	0	0	0	1,005	251	0	0	6,279
Firing Ranges								
Assessment	4,039	137	0	0	0	0	0	24,921
Remedial Actions	1,144	1,962	1,984	206	0	0	0	27,621
North Tech Areas								
Assessment	4,699	89	0	0	0	0	0	28,638
Remedial Actions	1,274	3,029	3,108	323	0	0	0	39,943
Surveillance And Maintenance	104	19	0	0	0	0	0	723
Offsite								
Assessment	695	60	0	0	0	0	0	4,466
Sitewide Activities								
Assessment	1,901	15	0	0	0	0	0	11,483
South Tech Areas								
Assessment	1,526	30	0	0	0	0	0	9,307
Remedial Actions	1,459	3,231	3,315	345	0	0	0	43,208
Surveillance And Maintenance	259	0	0	0	261	61	0	3,168
Thunder Range								
Assessment	2,657	67	0	0	0	0	0	16,276
Remedial Actions	798	1,991	2,042	212	0	0	0	26,014
Total	20,555	10,631	10,448	2,090	513	61	0	242,047

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

The cost estimates assume that a total of 41 sites will be remediated. All other sites are assumed to require no further action or voluntary corrective measures only. It is assumed, in determining these estimates, that remediation at all sites will be completed by FY 2011.

WASTE MANAGEMENT

The wastes for which Environmental Management is responsible at Sandia are low-level radioactive waste, low-level mixed waste, hazardous chemical waste, solid industrial waste, and sanitary waste. The hazardous chemical waste includes PCBs and asbestos, which are regulated by the Toxic Substances Control Act. Sandia operations also generate small quantities of transuranic waste, but no high-level waste is generated or handled at Sandia.

The current annual volumes of waste from operations are 3,400 cubic feet of low-level waste; 600 cubic feet of low-level mixed waste; about 800 kilograms of transuranic waste; 260,000 kilograms of chemical waste; 40,000 pounds of PCBs; 3,920 cubic yards of asbestos; and 26,000 cubic yards of solid waste. These quantities are not expected to change significantly for the next 30 years except for chemical waste, which is expected to increase to 300,000 kilograms in FY 1996 and 450,000 kilograms annually thereafter.

The total volumes of waste from remediation are roughly estimated to be 119,000 cubic yards of hazardous waste, 28,000 cubic yards of low-level radioactive waste, and 8,300 cubic yards of low-level mixed waste.

Decommissioning will generate a variety of waste, including about 3,000 cubic yards of concrete, 250 tons of debris steel, and about 1,200 cubic yards of asbestos. The quantities of radioactive and chemical waste will be relatively small (e.g., 175 fifty-five-gallon drums of low-level radioactive waste) because much of this material will be removed before decommissioning during facility stabilization.

To address waste management needs, several new facility changes are under consideration. They include an explosives-waste storage facility, a nuclear materials management facility, a facility for demilitarized and classified waste, office space for the Hazardous Waste Management Facility, and office space for waste management personnel. In addition, to support its changing mission, Sandia is developing waste management strategies and plans for new projects and processes at the Laboratories, such as the production of radiopharmaceuticals in Technical Area V.

Waste Treatment

Sandia uses only simple neutralization and solidification to treat its various waste streams. However, low-level mixed waste will be treated in accordance with the strategies identified in the mixed waste site treatment plan. The planned Radioactive and Mixed Waste Management Facility, expected to start operating in September 1995, will provide the means to open, treat, and repackage low-level waste and low-level mixed waste.

Processes that may be used at the Radioactive and Mixed Waste Management Facility are screening, neutralization, encapsulation, chemical stripping, crushing, precipitation, ion exchange, demineralization, shredding and baling, and stabilization. Treatment capacity will vary with the treatment process, but the facility may accommodate 55 cubic meters of low-level and low-level mixed waste per year.

Sandia continues to support technology development for the treatment of low-level mixed waste.

During FY 2005-2015, facility maintenance and upgrades will be needed for the use of mobile treatment units to maintain compliance with the Federal Facility Compliance Act. Equipment for treating low-level waste and process water will also be maintained, and capital equipment will be purchased as needed. Upgrades to the treatment facilities in the Radioactive and Mixed Waste Management Facility and the Hazardous Waste Treatment Facility are expected. Treatment activities for outyears to 2030 will include pursuing new and existing treatment options for low-level mixed waste, updating the equipment for the mobile treatment units, and maintaining or upgrading existing treatment facilities as needed.

Waste Storage

Sandia collects and packages waste from generator locations, transports them to onsite storage facilities, and ships waste to offsite disposal facilities. It purchases, installs, and maintains equipment necessary for the characterization and safe storage and handling of waste, such as waste assay equipment for mixed waste.

Hazardous chemical waste generated by research, development, and testing activities is collected from generator locations, segregated by hazard class, and transported to the Hazardous Waste Management Facility for storage. All low-level waste and low-level mixed waste are stored at generator sites or at an approved aboveground interim storage site at Technical Area III. For the latter, the waste is kept in containers approved by the U.S. Department of Transportation. All low-level waste packages are currently stored at the site pending approval for disposal at the Nevada Test Site.

In addition Sandia supports unique waste storage needs such as providing interim storage for transuranic waste from the Inhalation Toxicology Research Institute, which is also located at the Kirtland Air Force Base.

Existing waste storage facilities at Sandia include the Hazardous Waste Management Facility (Buildings 958 and 959), which is used for hazardous chemical waste; the interim storage site at Technical Area III, which is used for the storage of low-level radioactive and low-level mixed waste; and the High-Bay Waste Storage Facility (Building 6596) and the Chemical Waste Storage Facility (Building 920), both of which are used for mixed waste. Sandia also uses offsite storage in bunkers at the Manzano storage complex, which is owned by the Department of Defense. These bunkers are used for explosives, classified, and demilitarized waste.

The following facilities need to be modified in FY 1995:

- The High Bay Waste Storage Facility needs upgrading to bring it into compliance with legal and regulatory requirements for storing radioactive and mixed waste.
- The Radioactive/Mixed Waste Management Facility (Building 6920) needs paving for the outdoor storage of radioactive waste and for access to the Real-Time-Radiography Facility (Building 6635), which is used to examine waste containers. The facility also requires building modifications to be fully operational.
- The Chemical Waste Storage Facility requires the construction of a 1,200-square-foot addition to store PCB-contaminated material.
- The Manzano bunkers require improvements to maintain compliance with legal and regulatory requirements.

Also in FY 1995, a substantial effort will be required to develop and prepare the permit applications for the Hazardous Waste Management Facility. In FY 2000 and later years of the Life Cycle, all waste storage facilities will be maintained and upgraded to maintain compliance with applicable regulations.

Waste Disposal

Sandia has two landfills formerly used for hazardous, low-level, and mixed waste. Except for the classified waste landfill, Sandia no longer uses onsite disposal. It ships solid waste to local commercial facilities, liquid sanitary waste to municipal facilities, some radioactive waste to other facilities owned by DOE (i.e., the Nevada Test Site), and some low-level mixed waste to commercial facilities. For some waste streams, disposal options have not yet been identified; for others, such as transuranic waste, identified disposal options (i.e., the Waste Isolation Pilot Plant in New Mexico) are not yet available.

Detailed estimates of costs for various waste management activities are given in the Waste Management Activities table at the end of this summary.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

When a facility is transferred from Defense Programs to Environmental Management, it undergoes a process of stabilization in which the facility is shut down, radioactive and hazardous materials are removed, and other actions are taken as necessary to mitigate an immediate threat to health and safety. Once this is accomplished, the facility is maintained and monitored as appropriate further pending action, which is usually decommissioning.

This process began at Sandia in 1995. Of the 12 Sandia facilities slated for this process, 11 have already begun stabilization. These facilities include laboratories and a storage facility. It is assumed that the remaining facility (a corrugated burn structure) will begin the stabilization process in 1996. This report assumes that stabilization and maintenance at Sandia will be completed by 2013.

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-Level Mixed Waste	6,314	7,437	7,437	7,479	7,608	7,453	6,634	258,124
Low-Level Waste	5,409	6,371	6,371	6,371	6,371	6,371	5,207	217,766
Hazardous Waste	5,546	6,535	6,545	6,532	6,532	6,532	5,226	222,783
Sanitary Waste	113	133	133	133	133	133	106	4,529
Total	17,383	20,476	20,485	20,514	20,644	20,489	17,173	703,203

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

LANDLORD FUNCTIONS

Defense Programs is the landlord of Sandia National Laboratories/New Mexico, but Environmental Management provides and maintains the infrastructure needed for environmental restoration, waste management, and facility stabilization, as discussed below under program management.

PROGRAM MANAGEMENT

Program management represents cross-cut activities associated with all waste types and not directly in support of specific operations or projects. It provides overall support and direction for ongoing environmental remediation and for waste treatment, storage, and disposal activities at the laboratory. In addition to program management (i.e., the planning and management of resources and information to accomplish project goals, budgets, and schedules) and facility management (the care, maintenance, and replacement of existing facilities and facility-related equipment), it includes activities like quality assurance, personnel training, document development and control, records and data management and environmental restoration, and waste minimization and pollution prevention. Future direction (e.g., deciding on new facilities and processes) and special projects are also included.

Management activities at Sandia are divided into categories, such as support for the environment, safety, and health program; quality assurance; the training of personnel and contractors; emergency response; fire protection, centralized engineering, and maintenance; and safeguards and security.

An important management function is to ensure compliance with pertinent environmental regulations and laws. This includes guidance on regulations and policy as well as compliance tracking. Another is operations integration for the establishment and maintenance of performance expectations, measurements, and reports, support tracking, and the development and maintenance of operating plans and procedures.

Management is also responsible for the waste minimization program. This program tracks the amount of waste generated at the site and encourages the use of waste reduction methods. In the future it will assess opportunities for preventing pollution from priority waste streams, increase recycling efforts, and ensure the procurement of recycled products.

The entire Environmental Management program emphasizes participation by stakeholders, such as representatives of regulatory agencies, State and local governments, local residents, the public, and various organizations interested in environmental activities. Opportunities for

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	2,610	2,598	2,151	105	0	0	0	39,924

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

participation are provided by holding public hearings, soliciting comments on environmental plans and reports, and providing information.

The public participation program at Sandia is based on recommendations by a community relations team that represents both the public and the employees. The team has developed a strategic plan for the public participation program. The major objectives of this plan are to establish a process for forming a site-specific advisory board, to identify priorities for sharing information with the public, and to measure Sandia's commitment to building mutual trust through communication and cooperation.

Program Management services are tracked and charged through the budgets for waste management and environmental restoration activities. For FY 1995-2000, program management activities at the site consume approximately 20 percent of the total budget.

Breakdown of Costs

Sandia National Laboratories/New Mexico Defense Funding Estimate table shown below provides defense funding for environmental restoration, waste management, facility stabilization and maintenance, and landlord functions at Sandia National Laboratories/New Mexico. In addition, the Environmental Restoration Activity Costs Table provides cost estimates for environmental restoration at each of the major site areas discussed in this summary, and the Waste Management Activity Costs table gives estimates for waste treatment, storage, and disposal.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Sandia National Laboratories - Albuquerque.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	8,462	9,195	7,971	5,698	5,161	5,122	4,293	237,971

* Costs raflact a five-yaar avarage in constant 1995 dollars, axcapt in FY 1995-2000, which is a six-yaar avaraga

** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Management	17,383	20,476	20,485	20,514	20,644	20,489	17,173	703,203
Nuclear Material and Facility Stabilization	2,610	2,598	2,047	0	0	0	0	38,880
Program Management	3,757	5,119	5,121	5,129	5,161	5,122	4,293	172,268
Total	23,750	28,193	27,653	25,643	25,804	25,611	21,467	914,351

* *Costs reflect a five-yaar avaraga in constant 1995 dollars, except in FY 1995-2000, which is a six-yaar avarage.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	20,555	10,631	10,448	2,090	513	61	0	242,047
Nuclear Material and Facility Stabilization	0	0	104	105	0	0	0	1,044
Program Management	4,705	4,076	2,850	569	0	0	0	65,703
Total	25,260	14,707	13,403	2,764	513	61	0	308,794

* *Costs reflact a fiva-year averaga in constant 1995 dollars, axcept in FY 1995-2000, which is a six-year averaga.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

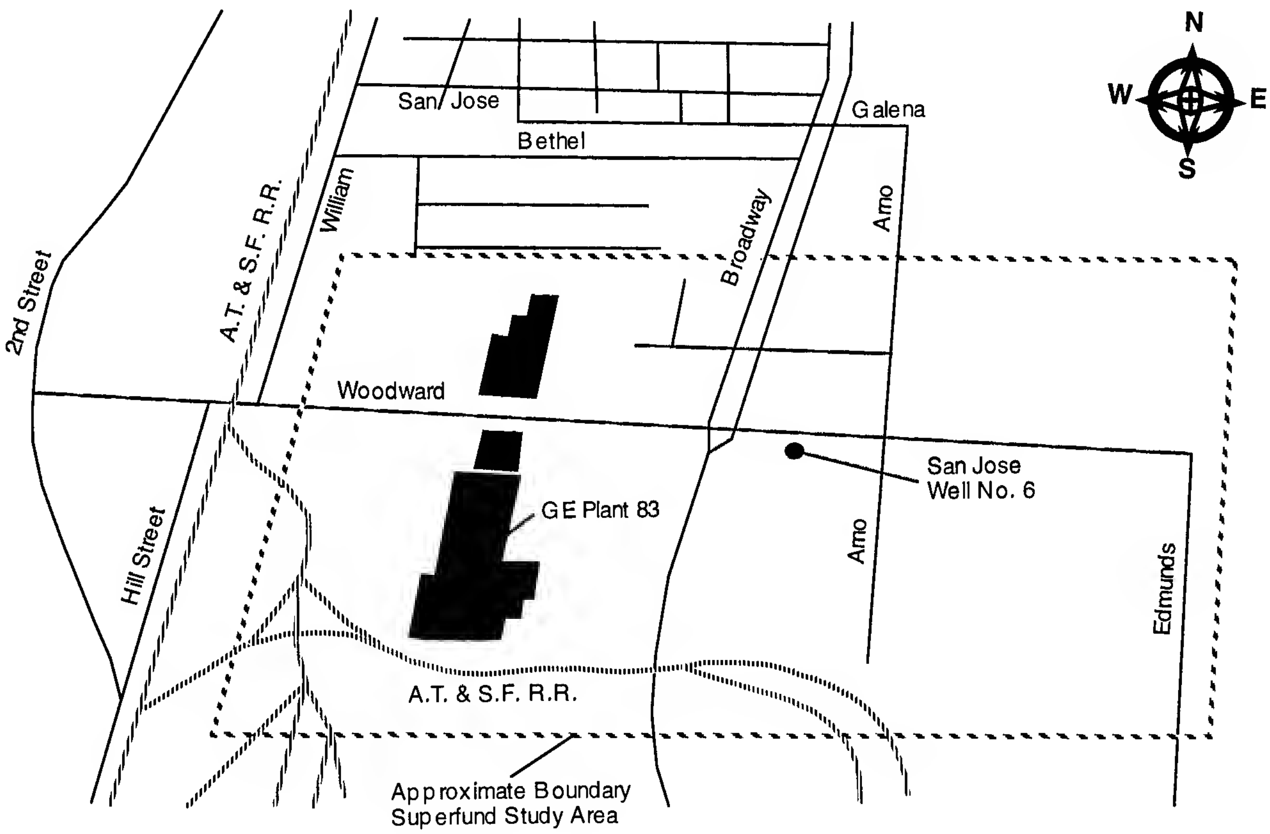
ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration:		Fiscal Year
North Technical Areas	Remediation Completed	2011
South Technical Areas	Remediation Completed	2011
Firing Ranges	Remediation Completed	2011
Thunder Range	Remediation Completed	2011
Site-Wide Activities	Assessment Completed	2001
Offsite Locations	Assessment Completed	2002
Waste Management:		
	Submit Affirmative Procurement Annual Report for FY 1995	1995
	Submit Annual Waste Reduction Report for FY 1995	1995
	Submit Mixed Waste RCRA Part B Permit Application 1133.013	1995
	Submit Final Site Treatment Plan to State of New Mexico FY 1995, 1133.015	1995
	Start Operations at Radioactive and Mixed Waste Management Facility, 1133.026	1995
	Complete Radioactive and Mixed Waste Management Facility Waste Acceptance Criteria	1995
	Submit Final NEPA Document for Interim Storage Treatment Facility	1995
	Complete Movement of Radioactive and Mixed Waste from Interim Storage Site	1995
	Complete Upgrades to Interim Storage Facility, 1137.02	1995
	Submit Final Site Treatment Plan to State of New Mexico, Federal Facilities Compliance Act	September annually

For further information on this site, please contact:

Public Participation Office	*(505) 845-5951*
Public Affairs Office	*(505) 844-6601*
Technical Liaison: Ted Pietrok	*(505) 845-5649*

SOUTH VALLEY SUPERFUND SITE

The South Valley Superfund Site is located in the south valley area of Albuquerque, New Mexico. The site covers an area of 1 square mile. The site houses industrial facilities that require environmental cleanup under the Comprehensive Environmental Response, Compensation and Liability Act.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	2136	4590	956	735	735	735

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	1,576	871	972	880	0	0	0	23,066

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

From 1951 to 1967, the site was owned by the Atomic Energy Commission. The Commission built the South Valley Works there for the manufacturing of nonnuclear components for nuclear weapons. From 1967 to 1983, the plant was owned by the U.S. Air Force and operated by General Electric. At that time, the South Valley Works was renamed Plant 83. In 1983, the plant was bought by General Electric, which remains the current owner.

The U.S. Environmental Protection Agency (EPA) has identified three parties that are potentially responsible for cleaning up the contamination generated by past operations at the site: the Department of Energy (DOE), the U.S. Air Force, and General Electric. All three parties are responsible for meeting the requirements stated in two records of decision.

The three parties reached an agreement outlining the percentage of cleanup costs that each party was responsible for providing. General Electric is currently responsible for operating the facility. The Department's only remaining mission at this site is to successfully complete the requirements of both records of decision and to reimburse General Electric for the percentage of cleanup costs as specified by the settlement agreement. The Department's mission at the site will end when environmental restoration has been completed.

ENVIRONMENTAL RESTORATION

At the South Valley site, ground-water contamination is present in both shallow and deep aquifers, which are separated by an impermeable clay layer. The EPA believes that industrial activities under all three of the site's owners contributed to contamination with

solvents, primarily trichloroethylene and dichloroethane. Soil contamination at several areas resulted from spills and solvents leaking from waste storage areas. The extent of contamination is low enough that no action beyond cleanup with a pilot-scale vacuum extraction system is expected to be necessary.

Planned activities include ground-water remediation in the shallow aquifer with a pump-and-treat system that involves extracting contaminated water, treating it, and then reinjecting the water into the aquifer. Ground water in the deep aquifer will be remediated with a pump-and-treat system that is expected to become operational during FY 1996. The remaining remediation activities will be related to operation, maintenance, and monitoring. These activities are expected to continue into FY 2015.

Under the terms of the settlement agreement, DOE does not manage the cleanup project but is liable for reimbursing General Electric for the cleanup costs. The Department will fund 43.2 percent of the cleanup costs incurred by General Electric in meeting the EPA cleanup standards.

WASTE MANAGEMENT

The Department is not involved in any waste management activities because it neither owns nor operates the facility. It is expected that the ground-water treatment will not create any waste streams.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

Under the terms of the settlement agreement, the Department only funds a portion of the cleanup project. The Department is not responsible for facility stabilization, maintenance, or monitoring.

LANDLORD FUNCTIONS

The Department has no landlord functions at this site.

PROGRAM MANAGEMENT

For this report, the program management responsibilities for South Valley are performed under the Albuquerque Operations Office cost estimate.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration Remedial Actions	1,576	871	972	880	0	0	0	23,066

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for South Valley.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	1,576	871	972	880	0	0	0	23,066

* Costs reflect e five-yeer averege in constent 1995 dollers, except in FY 1995-2000, which is a six-yeer average.

** Total Life Cycle is the sum of annual costs in constent 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration:		Fiscal Year
Shallow Ground-Water Remediation	Start Cleanup	1994
	End Cleanup	1997
Deep Ground-Water Remediation	Start Cleanup	1995
	End Cleanup	2015

* Costs reflect a five-year everage in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

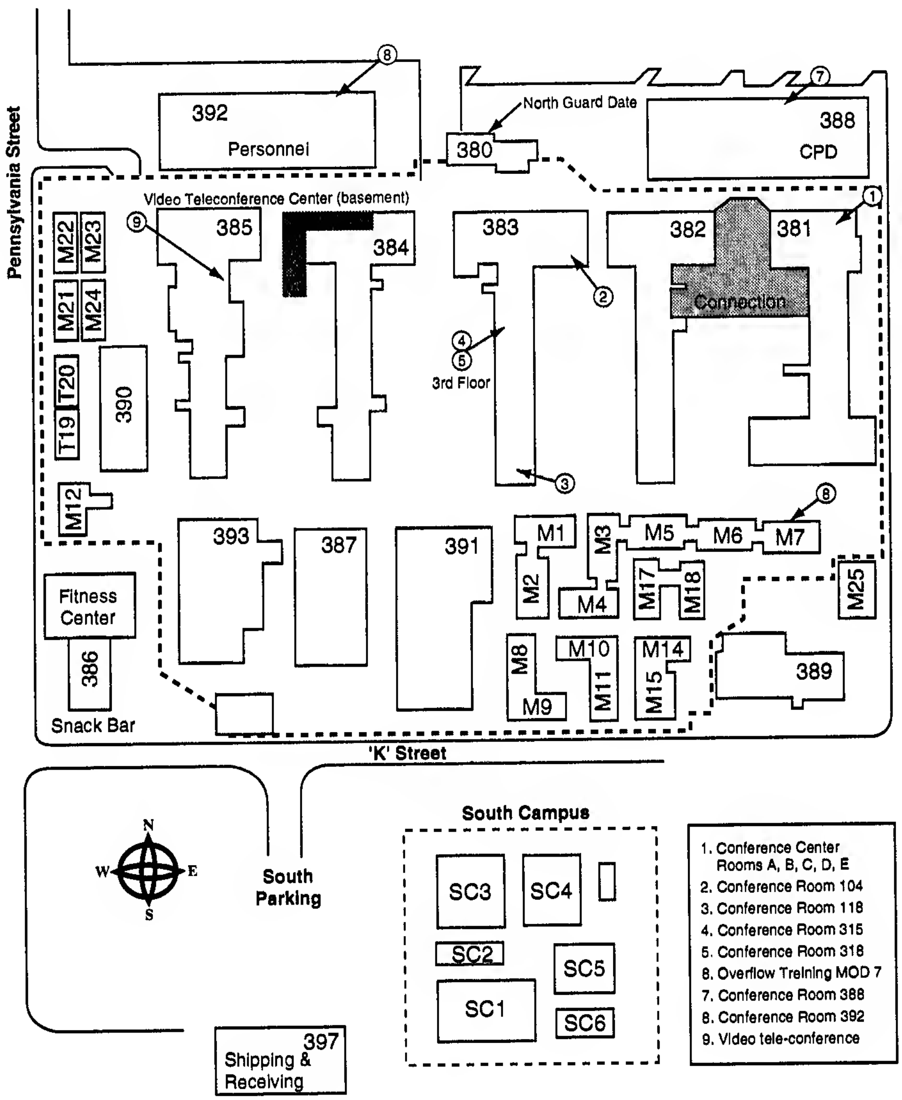
** Total Life Cycle is the sum of ennuel costs in constant 1995 dollars.

For further information on this site, please contact:

Public Participation Office	*(505) 845-5951*
Public Affairs Office	*(505) 845-6202*
Technical Liaison: John Corimer	*(505) 845-5956*

ALBUQUERQUE OPERATIONS OFFICE

The Albuquerque Operations Office is located on Kirtland Air Force Base directly south of the City of Albuquerque, New Mexico.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Program Management	31,760	28,284	29,837	30,332	31,824	32,763

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area essume 3% annuel inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Program Management	25,485	14,940	14,443	14,697	15,740	18,071	17,568	630,205

** *Costs reflect e five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year everege.*

*** *Totel Life Cycle is the sum of ennuel costs in constant 1995 dollers.*

PAST, PRESENT, AND FUTURE MISSIONS

The historical mission of the Albuquerque Operations Office has been research, development, production, and maintenance of nuclear weapons. In recent years ,this mission has evolved to include environmental management, science and technology, technology transfer and commercialization, and national energy objectives. In conjunction with this evolving mission, the Albuquerque Operations Office is charged through its environmental management programs, with responsibility for the safe and efficient cleanup of national laboratories and production plants within its complex, the sites in the uranium mill tailings program, and the development of the Waste Isolation Pilot Plant.

The Albuquerque Operations Office maintains oversight responsibilities for 11 facilities operated by the Department of Energy (DOE): the Grand Junction Project Office, Colorado; the Inhalation Toxicology Research Institute, New Mexico; the Kansas City Plant, Missouri; Los Alamos National Laboratory, New Mexico; the Pantex Plant, Texas; the Pinellas Plant, Florida; Sandia National Laboratories, California; Sandia National Laboratories, New Mexico; the South Valley Superfund Site, New Mexico; the Uranium Mill Tailings Project Office, Colorado; and the Waste Isolation Pilot Plant, New Mexico.

ENVIRONMENTAL RESTORATION

There are no current or planned environmental restoration activities at the Albuquerque Operations Office.

WASTE MANAGEMENT

There are no current or planned waste management activities at the Albuquerque Operations Office location.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization projects at the Albuquerque Operations Office location.

LANDLORD FUNCTIONS

Landlord costs are not applicable at the Albuquerque Operations Office.

PROGRAM MANAGEMENT

Program management oversight is provided to Albuquerque Operations Office facilities to ensure that environmental management activities are conducted within a framework of managerial and financial control. Guidance is developed and updated routinely to help the facilities under the Albuquerque Operations Office establish and maintain management and project control systems that facilitate efficient work and provide useful information about progress. Personnel annually review and refine work scopes, as well as cost and schedule estimates contained in Albuquerque Operation Office sites baseline documents.

Operations office personnel also conduct analyses of technical work plans as well as health and safety plans. Environmental compliance planning and oversight is another routine function conducted to ensure consistency with the objectives and goals of the environmental management program and compliance during implementation.

In addition, operations office personnel provide oversight in the areas of public participation, preparation of environmental documents (e.g., environmental impact statements), development of performance measures, and the establishment of risk-based priorities for facility environmental management activities. These initiatives help manage an effective public outreach program, institutionalize effective total-cost management practices, and ensure that activities that reduce risks to the environment and the public are performed in a timely manner.

The Life Cycle cost estimate for the Albuquerque Operations Office is given in the Estimated Site Total table.

Waste Minimization

One of the objectives of environmental management is reducing the amount of waste generated. The Albuquerque Operations Office has established a waste minimization program. The Albuquerque Operations Office has central oversight responsibilities for the waste minimization program and directly manages funding.

The waste minimization staff at each site provides program leadership, tracking and reporting of the amounts of waste generated, employee training, technical support for evaluating methods to reduce and recycle waste, and information and technology exchange to share successful waste reduction methods with other sites and industry. Program leadership at the sites is supplemented by Federal employees at both Albuquerque Operations Office and the area offices.

Agreements-In-Principle

Agreements-in-Principle are grants given to affected States. Their objective is to provide funds needed by the States for meaningful participation in the environmental management program. This includes obtaining the technical support necessary for the State's oversight of the DOE's environmental management projects and working with the Department to assess compliance with applicable Federal, State, and local laws and regulations. Agreements-in-principles also cover emergency response planning and training for incidents that may occur at the Department's sites. In addition, they provide funding for activities related to public awareness and information.

Currently, the Albuquerque Operations Office has Agreements-in-Principle with the States of New Mexico, Missouri, Florida, and Texas. The activities authorized for these States are not intended for use as direct support for State regulatory activities (issuance of permits and enforcement actions). The intent is to support nonregulatory activities, such as the monitoring of discharges, emissions, or biological parameters, as necessary to verify the effectiveness of the Department's environmental management programs.

Innovative Treatments for Environmental Remediation

A consortium of representatives from DOE, the U.S. Environmental Protection Agency, the States, and industry has been established to generate cost and performance data on innovative treatments for environmental remediation. The objective of the consortium is to accelerate use of this data throughout the complex. The Albuquerque Operations Office serves as the technical program coordinator for interfacing with the members of the consortium. This interface helps establish technical advisory and performance-evaluation groups for the demonstration of these innovative treatments.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Albuquerque Operations Office.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	25,485	14,940	14,443	14,697	15,740	18,071	17,568	630,205

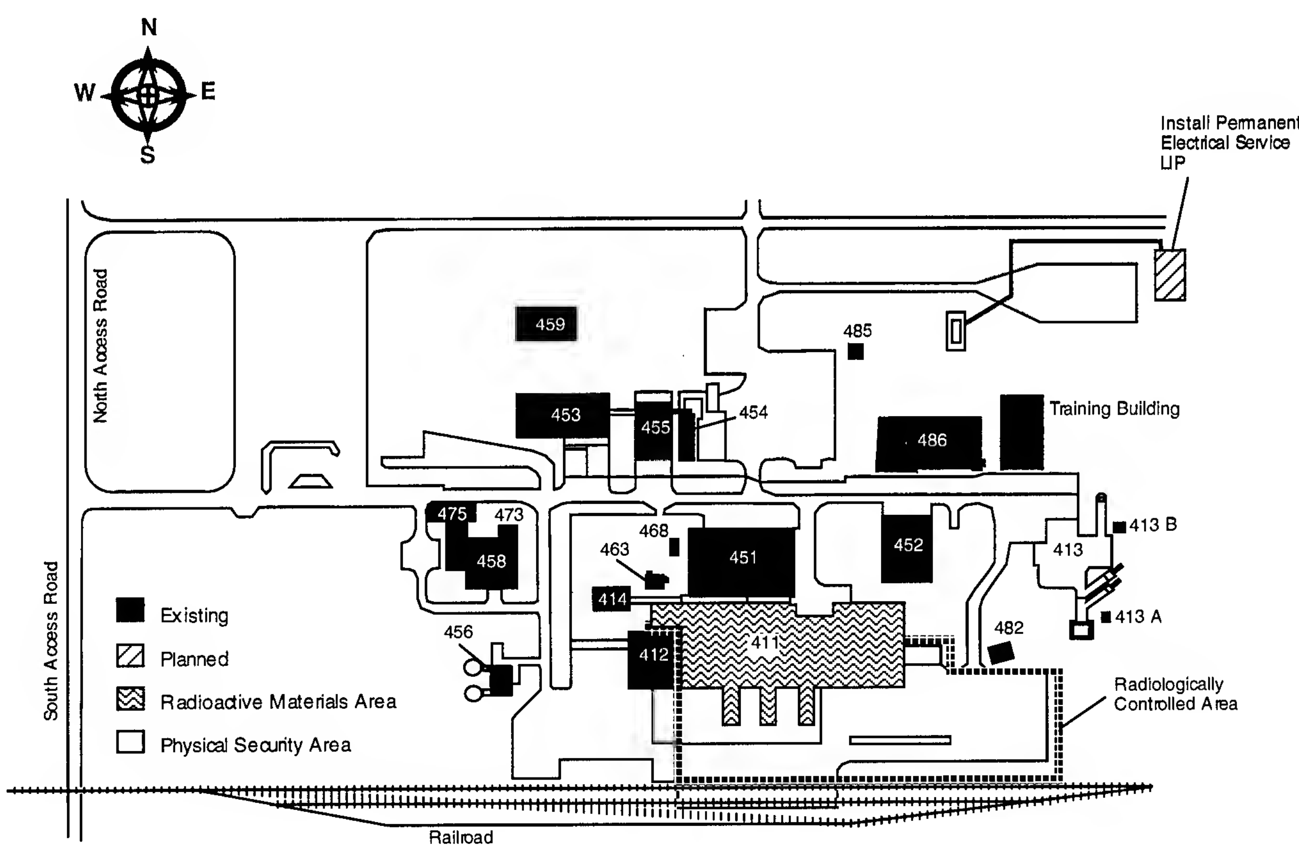
** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

For further information on this site, please contact:	*Public Participation Office*	*(505) 845-5951*
	Public Affairs Office	*(505) 845-6202*
	Technical Liaison: Sandy Norris	*(505) 845-6362*

WASTE ISOLATION PILOT PLANT AND NATIONAL TRANSURANIC WASTE PROGRAM OFFICE

The Waste Isolation Pilot Plant is located in southeastern New Mexico. Its occupies about 10,240 acres in Eddy County, 26 miles from the City of Carlsbad. The Department of Energy (DOE) Carlsbad Area Office, which manages both the Waste Isolation Pilot Plant program and the National Transuranic Program Office, is located in the City of Carlsbad.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Waste Management	139,185	149,360	154,720	156,640	157,920	158,800
Program Management	34,865	37,340	38,680	39,160	39,480	39,700
Total	174,050	186,700	193,400	195,800	197,400	198,500

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Waste Management	141,779	126,755	118,925	112,669	103,568	103,568	103,568	
Program Management	25,630	31,689	29,731	28,167	25,892	25,892	25,892	
Total	167,409	158,444	148,656	140,836	129,460	129,460	129,460	
	FY 2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle*****
Waste Management	103,568	103,568	103,568	82,854	0	0	0	6,163,729
Program Management	25,892	25,892	25,892	20,714	0	0	0	1,482,047
Total	129,460	129,460	129,460	103,568	0	0	0	7,645,776

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSION

The Waste Isolation Pilot Plant

The Waste Isolation Pilot Plant was authorized by Congress in 1979 as a facility for demonstrating the safe disposal of radioactive waste from defense activities and other programs of the Federal Government. The radioactive waste to be accepted at the Waste Isolation Pilot Plant is transuranic waste and mixed transuranic waste. Transuranic waste is radioactive waste that, regardless of source or form, is contaminated with alpha-emitting transuranic radionuclides (i.e., plutonium and other elements with atomic numbers higher than that of uranium) with half-lives longer than 20 years and in concentrations greater than 100 nanocuries per gram of waste. Mixed transuranic waste is transuranic waste that also contains hazardous chemicals.

The Waste Isolation Pilot Plant is a geologic repository mined about 2,150 feet below the surface in a massive formation of rock salt. It consists of an area in which experiments are conducted to study the properties of the host rock, access drifts, and a much larger waste disposal area. The repository has surface facilities in which waste will be received and inspected and four shafts that connect the surface facilities with the underground.

The basic mission of the Waste Isolation Pilot Plant is to provide permanent disposal for transuranic waste from defense activities. No high-level waste or spent fuel is to be emplaced there. At present, the near-term mission is to complete various scientific studies and to demonstrate the Waste Isolation Pilot Plant will provide permanent waste isolation in a manner that is safe and environmentally acceptable via compliance documents to be submitted to the U.S. Environmental Protection Agency (EPA) and the State of New Mexico.

The National Transuranic Program Office

The mission of the National Transuranic Program Office is to ensure that transuranic mixed waste owned by DOE is effectively and systematically managed from its generation to its final disposal.

The National Transuranic Program Office will develop strategic plans and program guidance for the generation, characterization, certification, packaging, transport, and disposal of transuranic waste. It will develop and direct the implementation of program guidance.

The Office will assess compliance with program guidance and ensure that activities are coordinated among all the sites at which transuranic waste is generated or stored.

ENVIRONMENTAL RESTORATION

No environmental restoration is needed at the Waste Isolation Pilot Plant site. The Waste Isolation Pilot Plant has not received or handled any radioactive waste, and no radioactive waste has been used in the tests conducted at the plant. All activities have been and are conducted in strict compliance with environmental regulations. Oversight is provided by State and Federal agencies.

WASTE MANAGEMENT

Waste Treatment and Storage

The Waste Isolation Pilot Plant will accept only those containers of transuranic waste that are certified to meet the final Waste Isolation Pilot Plant waste acceptance criteria, to be issued in December 1996. The Waste Isolation Pilot Plant will therefore not routinely treat the transuranic waste it receives. However, repackaging may occasionally be needed when waste containers are damaged. The costs for these activities are included with the costs of disposal, which will be the main function of the Waste Isolation Pilot Plant. No surface storage for transuranic waste will be provided at the Waste Isolation Pilot Plant site.

Waste Disposal

Disposal Capacity

By law, the maximum capacity for the Waste Isolation Pilot Plant is 6.2 million cubic feet for both contact-handled and remote-handled waste. The plant's design capacity for contact-handled transuranic waste is 500,000 cubic feet per year, and its capacity for remote-handled waste is approximately 10,000 cubic feet per year.

Disposal Strategy

On October 21, 1993, Secretary of Energy Hazel R. O'Leary announced a revised strategy for showing compliance for disposal at the Waste Isolation Pilot Plant. The strategy directs the Department to eliminate planned radioactive waste testing at Waste Isolation Pilot Plant in favor of increased offsite experimental and test activities. This strategy allows the Department to accelerate the preparation of the draft compliance-demonstration documents to be submitted to EPA and the State of New Mexico. The purpose of these documents is to demonstrate that the Waste Isolation Pilot Plant

meets EPA's criteria for the permanent disposal of transuranic waste and to seek EPA's certification of compliance. No transuranic waste can be received at the Waste Isolation Pilot Plant until this certification is granted. The revised strategy calls for draft compliance documents to be submitted to EPA and the State of New Mexico in March 1995, and final documents in December 1996.

The preparation of compliance documents is being supported by waste characterization and support activities at the Idaho National Engineering Laboratory, Rocky Flats Environmental Technology Site, Argonne National Laboratory-East, Argonne National Laboratory-West, and the Oak Ridge National Laboratory

The revised strategy calls for performance assessments conducted to evaluate compliance with the applicable EPA regulations, laboratory tests with transuranic mixed waste performed at sites other than the Waste Isolation Pilot Plant, and studies to establish that seals to be used in closing the repository will perform as expected.

Because a decision by the Secretary on the suitability of Waste Isolation Pilot Plant for disposal is scheduled to be made in FY 1998, the Department will start activities required to re-establish readiness of the Waste Isolation Pilot Plant only after achieving sufficient confidence that compliance will be demonstrated. Actual waste emplacement activities are expected to continue for at least 25 years.

Disposal Operations with Transuranic Waste

If EPA certifies the Department's compliance application on DOE's current schedule, the Waste Isolation Pilot Plant will start receiving waste in 1998. To be accepted at the Waste Isolation Pilot Plant for disposal, the waste will have to be certified that it meets the Waste Isolation Pilot Plant waste acceptance criteria. Additional waste-disposal panels will be excavated as needed while transuranic waste is being emplaced in another panel of the repository. The design calls for a total of eight panels, containing seven rooms each 300 feet long, 33 feet wide, and 13 feet high. Most of the waste disposal area will be used for contact-handled transuranic waste, which has relatively low levels of radiation at the waste container surface and can be directly handled by workers.

The active period of receiving and emplacement of waste will last at least 25 years. This period will start the day the first drum of transuranic waste is received. At the end of this period five years will be required to prepare the repository for permanent closure by backfilling the disposal panels and access drifts, sealing the shafts and boreholes, and decommissioning the surface facilities. Monuments and markers will be erected at the site to warn people about the presence of the repository. Institutional controls over the site are assumed to be maintained for 100 years.

Waste Generated at the Waste Isolation Pilot Plant

Industrial waste generated at the Waste Isolation Pilot Plant is disposed of in an offsite licensed municipal landfill. Sanitary waste is disposed of by an onsite sewage treatment facility. Hazardous waste is disposed of in a licensed treatment and storage disposal facility. Liquid low-level radioactive waste generated at the Waste Isolation Pilot Plant will be solidified (not considered treatment under the Resource Conservation Recovery Act Part B Permit) and placed in the repository . Solid low-level waste generated at the Waste Isolation Pilot Plant will be packaged and placed in the repository.

Transuranic Waste Disposal Cost Modeling

For the purposes of this estimate, the Waste Isolation Pilot Plant was assumed to be the disposal location for all transuranic waste

managed by the Environmental Management program, regardless of current legal restrictions on waste origin, capacity, and waste characteristics. Assumptions were made in order to perform a complete systems analysis regarding disposal of transuranic waste with no differentiation of source (defense or nondefense, current state (pre-1970 buried waste or post-1970 retrievably stored), and activity level (remote or contact-handled).

This estimate provides initial insight into what the integrated waste management disposal requirements are under the Department's change in mission, (e.g., the overwhelming majority of future transuranic waste will be derived from either remediation at previously used burial sites or facility stabilization and decommissioning). The total amount of transuranic waste needing disposal in the base case is 182,600 cubic meters. In consideration of the uncertainty in waste generation estimates, for the purpose of this analysis, the Waste Isolation Pilot Plant was considered to be filled to capacity and no other repository was constructed.

In a similar sense, the Waste Isolation Pilot Plant did not track the origin (defense or nondefense) of waste nor the source term, so other legal bounds may be exceeded in the base case analysis. Waste Isolation Pilot Plant is currently authorized to receive only defense waste, which is the overwhelming majority of all transuranic waste. The source term is important since there is a legal limit on remote-handled waste activity (total curies) and dose limits. The base case assumptions do not preclude future decisions and analysis regarding transuranic waste management. Important legal and programmatic changes would be needed to implement base case assumptions.

An assessment of the technical validity of keeping the Waste Isolation Pilot Plant open for an extended time period has not been performed as part of this estimate. Current Waste Isolation Pilot Plant planning is based on a 25-year operations period to reach capacity in 2023 with subsequent closure period (assuming all defense-related and no buried waste) at a cost of approximately $5 billion (1995-2028) in 1995 dollars. Receipt of all transuranic waste,

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Disposal								
Transuranic Waste	141,779	126,755	118,925	112,669	103,568	103,568	103,568	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Disposal								
Transuranic Waste	103,568	103,568	103,568	82,854	0	0	0	6,163,729

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

as predicted in this analysis, would cost $7.6 billion (1995-2049) in 1995 dollars, and keep the Waste Isolation Pilot Plant operating for 21 additional years.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at Waste Isolation Pilot Plant.

LANDLORD FUNCTIONS

The Waste Isolation Pilot Plant site landlord costs are included in its program total costs and are funded within waste management.

PROGRAM MANAGEMENT

The Waste Isolation Pilot Plant has no separate funding for program management. All program management activities are performed within the budgets for waste management activities. For the purposes of this report, 20 percent of the site's budget has been allocated for program management activities for FY 1995-2000.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Waste Isolation Pilot Plant.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	25,630	31,689	29,731	28,167	25,892	25,892	25,892	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Program Management	25,892	25,892	25,892	20,714	0	0	0	1,482,047

* *Costs reflect a five-yeer everege in constent 1995 dollars, except in FY 1995-2000, which is e six-year average.*

** *Total Life Cycle is the sum of ennuel costs in constent 1995 dollars.*

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Waste Management	141,779	126,755	118,925	112,669	103,568	103,568	103,568
Program Management	25,630	31,689	29,731	28,167	25,892	25,892	25,892
Total	167,409	158,444	148,656	140,836	129,460	129,460	129,460

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Waste Management	103,568	103,568	103,568	82,854	0	0	0	6,163,729
Program Management	25,892	25,892	25,892	20,714	0	0	0	1,482,047
Total	129,460	129,460	129,460	103,568	0	0	0	7,645,776

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is e six-year everage.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Waste Management:		Fiscal Year
National Transuranic Waste Program Office	Develop Alternatives and Strategies to Dispose of All Transuranic Waste.	1995
National Transuranic Waste Program Office	Waste Inventory Definition to Final Compliance Package.	1996
National Transuranic Waste Program Office	Issue final Waste Isolation Pilot Plant Waste Acceptance Criteria	1996
National Transuranic Waste Program Office	Submit Comprehensive Transuranic Waste Disposal Plan to Congress.	1997
Waste Isolation Pilot Plant	No-Migration Determination Issued by Environmental Protection Agency	1997
Waste Isolation Pilot Plant	Issue Final Disposal Phase Supplemental Environmental Impact Statement Record of Decision	1998
Waste Isolation Pilot Plant	Issue Decommissioning and Post Decommissioning Land Management Plan	1998
Waste Isolation Pilot Plant	EPA Certification of Compliance with 40 CFR 191, Issuance of RCRA Part B Permit	1998
Waste Isolation Pilot Plant	Secretary of Energy Decision to Operate Waste Isolation Pilot Plant as a Disposal Facility	1998
Waste Isolation Pilot Plant	Begin Contact-Handled Disposal Operations	1998
National Transuranic Waste Program Office	Fabrication of First Remote-Handled Cask complete.	1998
Waste Isolation Pilot Plant	Begin Remote-Handled Disposal Operations	1999
Waste Isolation Pilot Plant	Full Disposal Operations	2000 - 2023 (2049)*
Waste Isolation Pilot Plant	Site Restoration	2025 - 2030 (2059)*

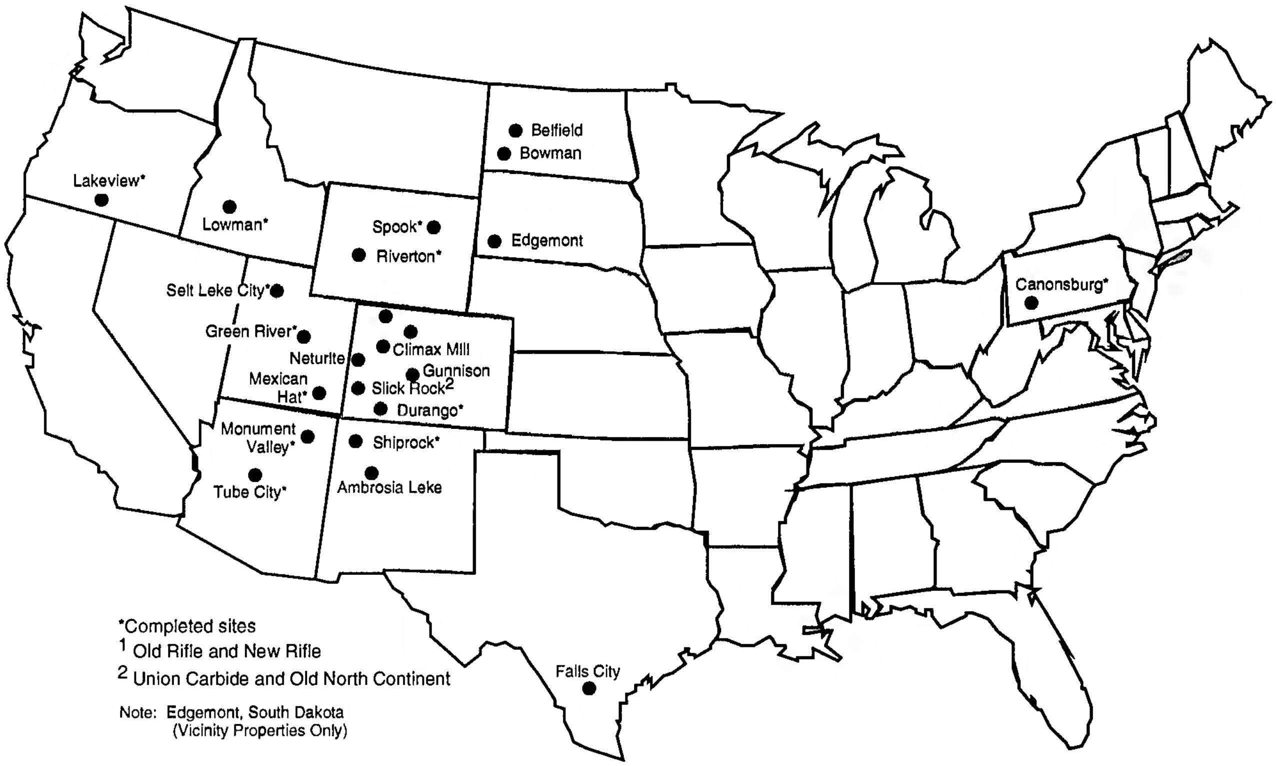
* See text, Transuranic Wasta Disposel Cost Modeling on pg. NM 52.

For further information on this site, please contact: *Public Participation Office* (505) 845-5951
Public Affairs Office (505) 234-7327
Technical Liaison: Della Conway (505) 234-7319

URANIUM MILL TAILINGS REMEDIAL ACTION PROGRAM OFFICE

24 Surface and Ground-Water Sites in 10 States

There are 24 designated Uranium Mill Tailings Remedial Action (UMTRA) sites located in 10 States. These States include Arizona (2 sites), Colorado (9 sites), Idaho (1 site), New Mexico (2 sites), North Dakota (2 sites), Oregon (1 site), Pennsylvania (1 site), Texas (1 site), Utah (3 sites), and Wyoming (2 sites). The UMTRA Program Office is located in Albuquerque, New Mexico.



*Completed sites
1 Old Rifle and New Rifle
2 Union Carbide and Old North Continent

Note: Edgemont, South Dakota (Vicinity Properties Only)

PAST, PRESENT, AND FUTURE MISSIONS

The U.S. Congress passed the Uranium Mill Tailings Radiation Control Act in 1978 in response to public concerns regarding potential health hazards from long term exposure to radiation from uranium mill tailings. The Act authorized the Department of Energy (DOE) to stabilize, dispose of, and control uranium mill tailings and other contaminated material at 24 uranium mill processing sites and approximately 5,000 vicinity properties.

Most uranium ore mined in the United States in the 1950's and 1960's was processed by private firms for the Atomic Energy Commission, a predecessor of DOE. The processing plants were shut down, and the tailings piles from mill operations were abandoned. The tailings piles present a potential long term health hazard because they contain low-level radioactive and other hazardous materials that migrated to surrounding soil, ground water, and surface water. Furthermore, the piles often emit radon gas. The tailings, and other ontaminated material were also used as fill dirt or incorporated into various construction materials at numerous offsite locations (vicinity properties).

The mission is to remediate 24 designated processing sites as required by the Act. By the end of FY 1995, 15 sites will have been completed and 7 sites will be under active remediation. The final two sites will begin remediation in FY 1996.

Remediated processing sites will not be returned to the public for either limited or unrestricted use until compliance with Environmental Protection Agency (EPA) standards for ground water have been met through the Uranium Mill Tailings Ground-water Compliance Project. Also, approximately 5,000 vicinity properties are being remediated by the project. Disposal cells containing the contaminated material will be maintained by the Federal Government as defined in the long-term surveillance plan.

ENVIRONMENTAL RESTORATION

Former uranium processing activities at most of the 24 inactive mill sites resulted in contamination of ground water beneath, and in some cases, downgradient of the sites. This contaminated ground water often has elevated levels of contaminants such as uranium or nitrates. After completion of the Uranium Mill Tailings Ground-Water Compliance Project; all of the sites will be returned, at least in part, to the State as identified in the UMTRA Surface Project Plan.

For the 11 sites using the stabilize-in-place or stabilize-onsite disposal option, only the portion of the site not having a disposal cell will be available for restricted use. The portion of the site that contains the disposal cell will be maintained by the Federal Government under the Long-Term Surveillance and Maintenance program. For the 13 remaining sites using the relocation option, the entire site will be available for unlimited use. In most cases, the title to the site will return to the State or to the original owners.

A programmatic environmental impact statement will be used as a decisionmaking framework for determining the project wide ground-water compliance strategy. The programmatic approach proposed, in the UMTRA Ground-Water Programmatic Environmental Impact Statement, is to evaluate specific conditions at each site and select a compliance strategy that will meet the applicable EPA standards. The proposed compliance strategies reflect the variety of

ground-water conditions anticipated at the UMTRA sites. These strategies range from no further action required to engineered remedial actions.

The draft programmatic environmental impact statement is scheduled to be published in the spring of 1995. In conjunction with that activity, the project is proceeding with preparation of site-specific baseline risk assessments. These assessments serve to evaluate risks to human health and the environment by collecting field data and performing calculations and simulations. With one exception, the baseline risk assessments will be complete by FY 1995. The last baseline risk assessment is scheduled for completion in FY 1996. Site observational work plans for applicable sites began in FY 1994 and will continue through 2004 per the project schedule.

The site observational work plans will define the technical scope, objectives, and strategies for the anticipated activities at the site from characterization through engineering design and remediation. Site-specific environmental assessments, borrowing from the programmatic framework defined in the programmatic environmental impact statement, will describe each site's compliance strategy. Because they follow the completion of the site observational work plans, preparation of environmental assessments will be initiated in FY 1996 and continue, according to the project schedule, through FY 2005.

The site-specific remedial action plans will describe regulatory compliance strategies for the sites where active remediation strategies are proposed. The remedial action plans will contain sufficient information for the Nuclear Regulatory Commission, States, and Tribes to concur upon the selection of the compliance strategy. Remedial action plans will be initiated just prior to finalization of environmental assessments and publishing of the Findings of No Significant Impacts in the Federal Register. They are scheduled to begin in FY 1997 and continue through FY 2007.

Each site's compliance strategy will ultimately be consistent with the proposed action in the UMTRA Ground Water Programmatic Environmental Impact Statement. This impact statement will reflect the results of site-specific risk evaluations. The UMTRA Ground-Water Compliance Project, for purposes of creating a budget estimate, has proposed three primary compliance strategies. These strategies include no further action, passive, and active.

Although no decisions can be made prior to release of the programmatic environmental impact statement, budget preparation needs require that site-specific scenarios be addressed as described above. For budgeting purposes only, two sites were suggested for active compliance strategies. The remaining sites would have passive (natural flushing) strategies imposed, additional characterization, or no further action. This would mean that active remediation could begin as early as FY 2002, with completion possible by FY 2014.

Future assessment efforts for the UMTRA Surface Project will center around the assessment of new vicinity properties (particularly Climax Mill in Grand Junction, Colorado) and the certification and licensing of all completed disposal cells. Remediation will consist of completing those six sites started prior to FY 1995, starting the cleanup of the last five processing sites in FY 1995 and FY 1996, and completing cleanup of all sites by the end of FY 1998. Activities in FY 1999 will consist of finalization of site and vicinity property completion reports.

WASTE MANAGEMENT

Waste management at all UMTRA sites is conducted within the scope of environmental restoration activities.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities required at the UMTRA sites.

LANDLORD FUNCTIONS

Landlord activities are the responsibility of the owner at each site. In cases where DOE will maintain control of the site and continue long-term surveillance and maintenance, landlord costs are represented in the UMTRA life cycle cost estimate for the State in which that site is located.

PROGRAM MANAGEMENT

Program management supports management efforts for the National Environmental Policy Act process, site characterization and licensing, public information/participation, quality assurance audits, program and management support for the technical assistance contractor, special studies, document control, technical assistance contractor site and technical management, cost and schedule controls, planning and preparation of the Federal budget, and the Environmental Management Progress Tracking System. Also included is indirect support required by the DOE Program Office for operations and coordination.

For further information on this site, please contact:

Public Participation Office	*(505) 845-5951*
Public Affairs Office	*(505) 845-6202*
Technical Liaison: Jody Metcalf	*(505) 845-6146*

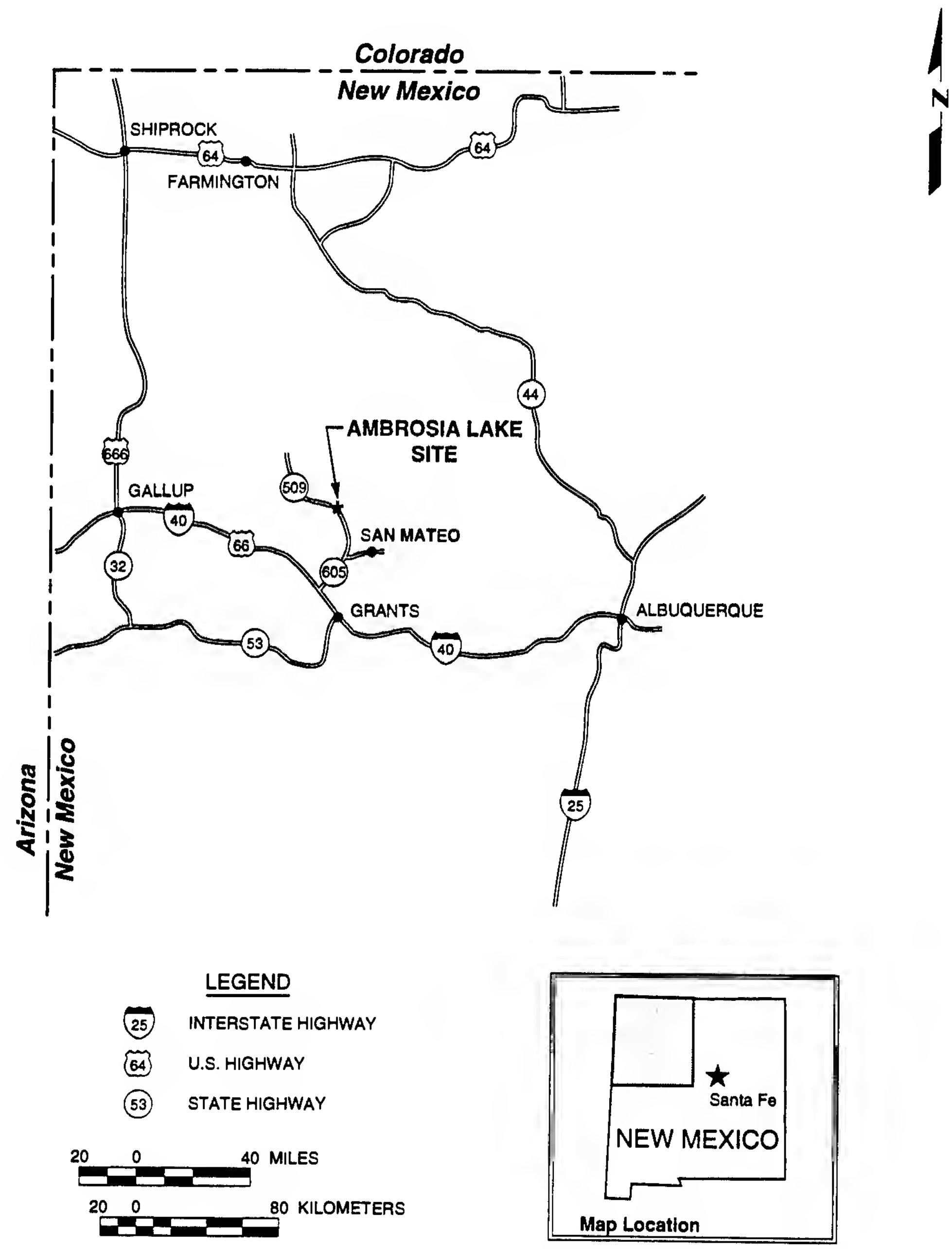
NEW MEXICO UMTRA SITES

The Ambrosia Lake former processing site is one of 24 uranium mill processing sites designated by the Uranium Mill Tailings Radiation Control Act for remediation by the Department of Energy (DOE). Most uranium ore mined in the United States in the 1960's was processed by private firms for the Atomic Energy Commission, a predecessor of DOE. The Act was passed in 1978 in response to public concerns regarding potential health hazards from long term exposure to uranium mill tailings. It authorized the DOE to stabilize, dispose of, and control uranium mill tailings and other contaminated material at 24 uranium mill processing sites and vicinity properties. Uranium Mill Tailings Remedial Action (UMTRA) activities are funded through the Albuquerque Operations Office.

The cost estimate model used for this report provides costs for each of the UMTRA sites. All costs for waste management activities, program management, and relevant landlord activities attributable to DOE are provided for within the scope of environmental restoration. There are no Uranium Mill Tailings Radiation Control Act sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense.

AMBROSIA LAKE
(Uranium Mill Tailings Remedial Action Project Site)

The Ambrosia Lake former processing site is located in McKinley County, approximately 85 miles northwest of Albuquerque.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	390	260	10	0	0	0

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area essume 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	119	0	0	0	0	0	0	715

** Costs reflect e five-yeer everage in constent 1995 dollers, except in FY 1995 - 2000, which is e six-yeer averege.

*** Totel Life Cycle is the sum of ennual costs in constent 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The mill was built in 1957 and was originally operated by the Phillips Petroleum Company. United Nuclear Corporation purchased and operated the mill for a brief period in 1963. United Nuclear shut down milling operations in 1963, but retained ownership of the site. An ion exchange system was operated at the site by United Nuclear in the late 1970's to early 1980's to extract uranium from mine water. Homestake Mining purchased United's interest in 1981.

DOE will maintain control of the site and continue long term surveillance and monitoring.

ENVIRONMENTAL RESTORATION

The activities at this site have resulted in contaminated soil, millsite rubble, and windblown material.

Surface remediation is ongoing at Ambrosia Lake. Approximately 2 million cubic yards of uranium tailings exist onsite and some 396,000 tons of tailings have been removed and used as mine fill. To date, DOE has buried all contaminated and uncontaminated mill structure debris, and folded the north half of the tailings pile over the south half. DOE has also completed the cleanup of windblown material and constructed a radon barrier and bedding layer. In 1995, DOE plans to complete site restoration and place erosion protection material. Remediation is expected to be completed in April 1995. The following table shows the costs for environmental restoration projects at this site. All funding is from nondefense sources.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Ambrosia Lake.

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
UMTRA-Ground Water - New Mexico	23	0	0	0	0	0	0	137
UMTRA-Soils - New Mexico	96	0	0	0	0	0	0	578
Total	119	0	0	0	0	0	0	715

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

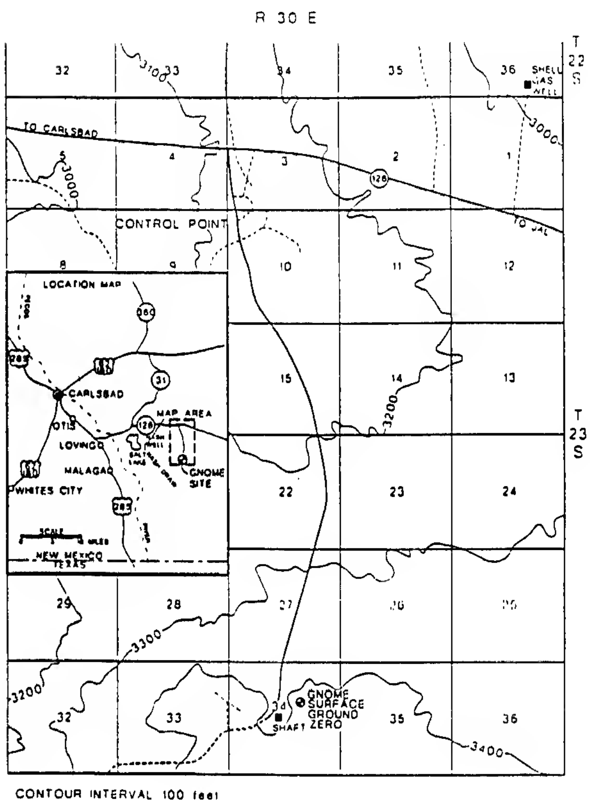
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	119	0	0	0	0	0	0	715

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

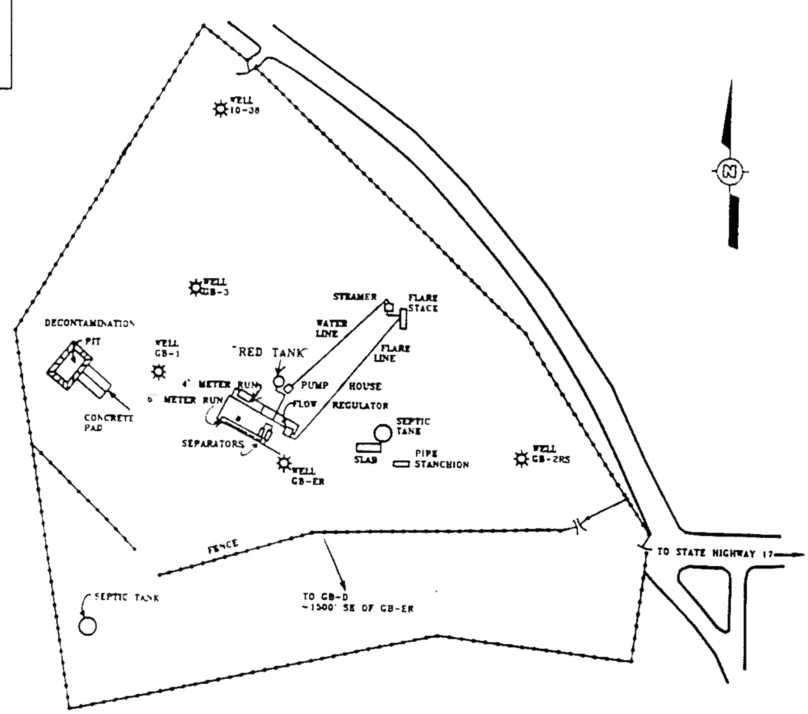
** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

For further information on this site, please contact:	*Public Participation Office*	*(505) 845-5951*
	Public Affairs Office	*(505) 845-6202*
	Technical Liaison: Jody Metcalf	*(505) 845-6146*

GNOME-COACH SITE AND GASBUGGY SITE
(Nevada Offsite Program)



GNOME-COACH SITE



GASBUGGY SITE

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	130	1,480	1,480	3,130	3,280	2,130

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

(Five-Year Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	1,817	175	80	47	16	8	6

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	1	0	0	0	0	0	0	12,569

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annuel costs in constent 1995 dollers.

PAST, PRESENT, AND FUTURE MISSIONS

The Gnome-Coach and Gasbuggy sites were part of the Plowshare Program, which was a series of nuclear and conventional tests by the Atomic Energy Commission to explore peacetime uses of nuclear explosives. The Project Gnome detonation occurred in bedded salt in December 1961. The test vented radioactivity to the atmosphere. As a result, Project Coach, another experiment scheduled for this location, was cancelled. The Gasbuggy Site was used for a single subsurface nuclear test conducted in December 1967 to determine whether or not nuclear explosions would stimulate release of natural gas not recoverable by conventional methods. It was the first joint government/industry gas stimulation experiment. The vicinity of the sites is being monitored as part of the long-term hydrological monitoring program.

ENVIRONMENTAL RESTORATION

Funding for this activity provides for continued synthesis and evaluation of information collected during monitoring of the Gasbuggy and Gnome-Coach sites in New Mexico. This activity will define the magnitude and extent of contamination and risks associated with that contamination through evaluation of information. This process will include the characterization of the physical setting and testing areas, the definition of the occurrence of

contamination, and the identification of pathways to reach a potential receptor. The risks to receptors will also be calculated using standard risk assessment procedures. Should risks exceed acceptable limits, remedial actions at the New Mexico test sites will be initiated. For this estimate, remediation was assumed to include removal of contaminated surface soil due to venting at the Gnome-Coach Site and faulty well pipe repairing and monitoring at the Gasbuggy Site. Remediation at Gnome-Coach was assumed to begin in 1998 and be complete in 2000. Activities at the Gasbuggy site were assumed to begin in 1995 and be completed in 1999.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Nevada Offsite - New Mexico							
Assessment	1,163	65	0	0	0	0	0
Remedial Actions	654	0	0	0	0	0	0
Surveillance And Maintenance	0	110	80	47	16	8	6
Total	1,817	175	80	47	16	8	6

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Nevada Offsite - New Mexico								
Assessment	0	0	0	0	0	0	0	7,301
Remedial Actions	0	0	0	0	0	0	0	3,923
Surveillance And Maintenance	1	0	0	0	0	0	0	1,345
Total	1	0	0	0	0	0	0	12,569

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	1,817	175	80	47	16	8	6

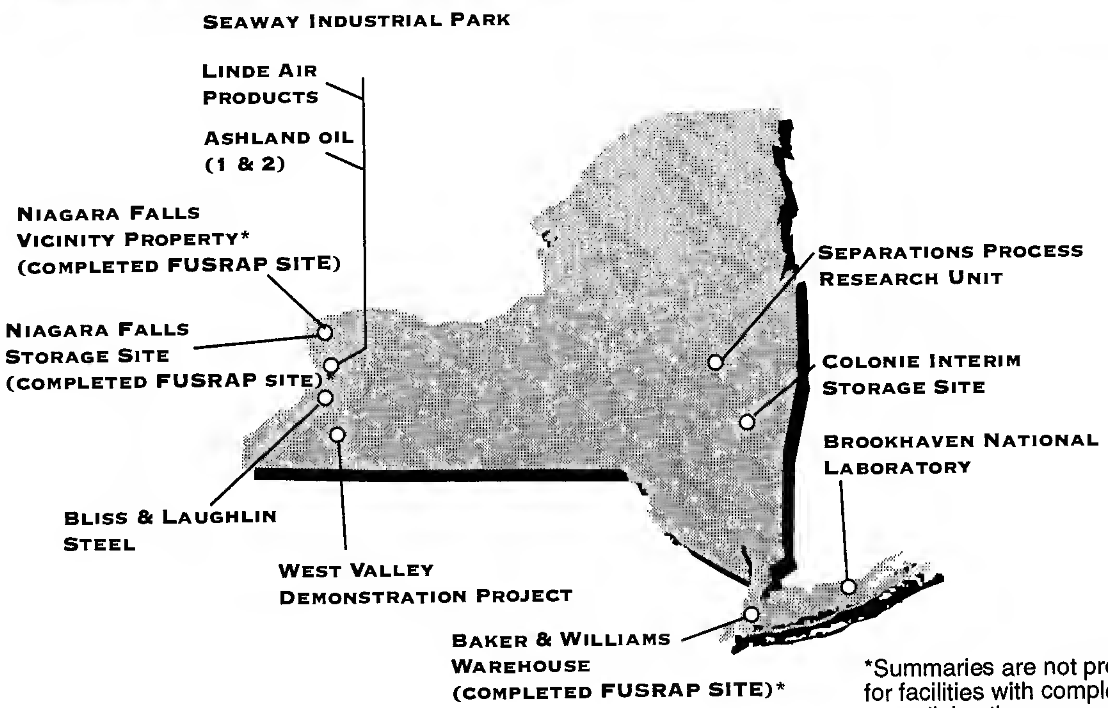
	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	1	0	0	0	0	0	0	12,569

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

For further information on this site, please contact:

Public Participation Office		*(702) 295-4652*
Public Affairs Office		*(702) 275-3521*
Technical Liaison:	*Bobbie McClure*	*(702) 295-1862*



*Summaries are not provided for facilities with completed remedial actions.

NEW YORK

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Brookhaven Notionol Loborotory	25,606	31,038	41,789	41,742	45,415	52,419
Seporotion Process Reseorch Unit	0	0	0	0	0	3,000
West Volley Demonstrotion Project	125,000	130,000	135,000	142,000	150,000	160,000
New York - FUSRAP	20,800	28,930	36,200	22,880	18,300	24,760
TOTAL	171,406	189,968	212,989	206,622	213,715	240,179

* *Costs for FY 1995 reflect Congressionel Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenerio, costs for sheded eree essume 3% ennuel infletion.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

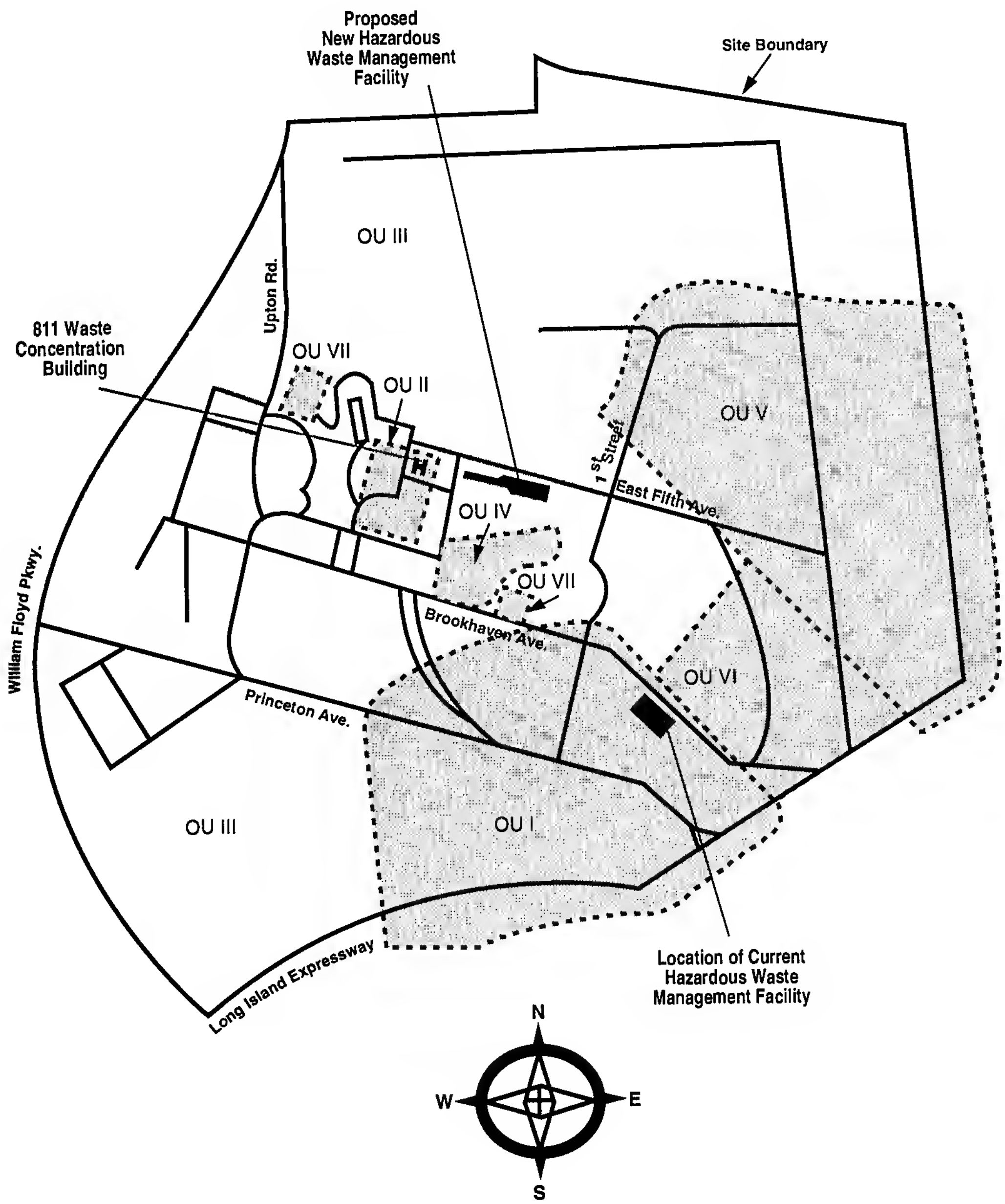
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Brookhaven Notionol Loborotory	36,638	28,273	18,819	11,588	9,395	7,440	5,813	626,473
Seporotion Process Reseorch Unit	431	29,400	0	0	0	0	0	149,588
West Volley Demonstrotion Project	135,451	118,240	93,440	108,000	125,440	145,280	0	3,764,705
New York - FUSRAP	25,209	16,956	13,890	12,911	0	0	0	370,041
Totol	197,729	192,869	126,148	132,499	134,835	152,720	5,813	4,910,807

** *Costs reflect e five-yeer everege in constent 1995 dollars, except in FY 1995 - 2000, which is e six-yeer averege.*

*** *Totel Life Cycle is the sum of ennuel costs in constant 1995 dollars.*

BROOKHAVEN NATIONAL LABORATORY

Brookhaven National Laboratory is located in Upton, New York, on Long Island, about 75 miles from New York City. It is managed through the Department of Energy (DOE) Chicago Operations Office.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	11,075	21,992	31,874	31,210	34,636	41,295
Waste Management	12,206	7,520	8,030	8,600	8,800	9,000
Nuclear Material	0	126	454	454	454	454
Program Management	2,325	1,400	1,431	1,478	1,525	1,670
Total	25,606	31,038	41,789	41,742	45,415	52,419

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	26,363	18,985	9,432	3,498	2,525	311	0	330,567
Waste Management	8,421	5,831	5,721	5,716	5,714	5,704	4,651	217,212
Nuclear Material	324	437	1,038	35	0	0	0	9,491
Program Management	1,530	3,020	2,628	2,339	1,428	1,426	1,163	69,203
Total	36,638	28,273	18,819	11,588	9,395	7,440	5,813	626,473

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Brookhaven National Laboratory is the former site of a U.S. Army installation (Camp Upton) and has been involved in research and development activities in support of DOE and its predecessor agencies' missions since 1947. Brookhaven National Laboratory's current mission is to conduct fundamental research, including conception, design, construction, and operation of large, complex research facilities.

These facilities are used to carry out both basic and applied research in high energy and nuclear physics; in basic energy sciences emphasizing fundamental research on biological, chemical, and physical phenomena underlying energy-related transfer, conversion, and storage systems; and in the life sciences, nuclear medicine, and medical applications of nuclear techniques. As a national resource, Brookhaven National Laboratory makes available, when feasible, its unique facilities and expertise to State and Federal agencies and to the private sector. It is assumed Brookhaven National Laboratory will continue to operate as a multi-program national laboratory for the foreseeable future.

Environmental restoration activities will conclude in 2025 at the assumed funding levels. However, laboratory operations will continue

to generate waste. Continuing waste management activities in support of ongoing programs are projected at a cost of approximately $5.7 million per year. To facilitate the development of this life-cycle cost estimate, an arbitrary cutoff date of 2029 has been assigned to all sites that have completed environmental restoration but maintain ongoing waste management support of other Department programs (Energy Research, Defense Programs, etc.).

ENVIRONMENTAL RESTORATION

The principal environmental medium of concern at Brookhaven National Laboratory is ground water. Because Brookhaven National Laboratory is situated over a sole-source aquifer providing potable water for Long Island, the Environmental Protection Agency (EPA) placed Brookhaven National Laboratory on the National Priorities List in 1989. As a result, Brookhaven National Laboratory's environmental restoration activities are focused on remediation of contamination resulting from past research and development work that may have migrated through soils, surface water, and related transport mechanisms into the aquifer. Characterization investigations are being completed to clarify the extent of remediation needed. Contaminants of concern include metals, organic compounds, and radionuclides such as tritium and cesium-137. Contamination occurred as a result of accidental spills and/or past operating practices.

Brookhaven National Laboratory signed an Interagency Agreement with the Environmental Protection Agency and the New York State Department of Environmental Conservation which became effective in 1992. The Interagency Agreement integrates requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the National Environmental Policy Act, and State regulations. In addition, the Interagency Agreement divides Brookhaven National Laboratory into "Areas of Concern" that have been grouped into Preliminary Assessment/Site Inspection Areas of Concern, sites where a documented release occurred; Operable Units, groupings of Areas of Concern based on similar activities, similar contaminants, and/or geographic continuity; and a Removal Activities unit which describes the interim removal actions across the site.

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	26,363	18,985	9,432	2,028	1,272	311	0	318,316
Facility Decommissioning	0	0	0	1,470	980	0	0	12,251
Total	26,363	18,985	9,432	3,498	2,252	311	0	330,567

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

In general, Brookhaven National Laboratory expects to continue with the remedial investigation work currently underway as specified by the Interagency Agreement. Remedial activities will be designed and completed as dictated by results from investigations at specific operable units, with ground-water remediation and prevention of further contamination being the focus of restoration activities. Contaminants, media, and risk are presented by grouping below.

Operable Unit I

Sources of contamination have included the Hazardous Waste Management Facility, in operation since 1949; two landfill areas, both now closed; and two stormwater runoff recharge basins. Contaminants include uranium and plutonium isotopes, cesium-137, tritium, strontium-90, organics, and metals. Contaminated media at Operable Unit I consist of soil, ground water, surface water, surface sediment, air, flora and fauna. The extent of contamination is unknown, pending ground-water contamination has migrated offsite. It is anticipated the Remedial Investigation/ Feasibility Study for this Operable Unit will be completed in 1997, and remedial activities indicated by the results of data analysis will follow. At this time, Brookhaven National Laboratory expects to initiate remedial action in 1998 and complete all work under Operable Unit I by 2013.

Operable Unit II

Sources of contamination have included the Brookhaven Graphite Research Reactor, the Waste Concentration Facility, the Alternate Gradient Synchrotron Department scrapyards, and the site sewage system. Contaminants include cesium-137, cobalt-60, strontium-90, cesium-134, organics, and inorganics. Contaminated media at Operable Unit II include soil and ground water. The extent of contamination is unknown, pending completion of the Remedial Investigation. The assessment portion of Operable Unit II is expected to be completed by 2000, with any subsequent remediation activities that may be required completed by 2014.

Operable Unit III

Sources of contamination have included a building transfer line and underground storage tanks; Bubble Chamber Area; water supply and distribution system, a monitoring well; the Physic's Department's Cloud Chamber Group; the old firehouse, two production supply wells; the site sewage system, warehouse area, and several buildings, including former chemistry buildings. Contaminants include organics, inorganics, tritium, strontium-90, cesium-137, sodium-22, and cobalt-60. Contaminated media at Operable Unit III include soil, ground water, surface water, surface sediment, air, flora and fauna. The extent of contamination is not fully known (ground-water contamination has migrated offsite), pending completion of a remedial investigation. The Remedial Investigation/Feasibility Study portion for Operable Unit III is expected to be completed by 2000, with any required remedial actions concluded in 2014.

Operable Unit IV

The sources of contamination include the Central Steam Facility, the Reclamation Facility; two water supply wells, the site sewage system, and a recharge basin. Contaminants include organics, inorganics, uranium, plutonium, and europium isotopes, strontium-90, tritium, cesium-137, and radium-226. Contaminated media at Operable Unit IV include soil and ground water. Remedial Investigations were completed for Operable Unit IV in 1994. The extent of contamination will be fully known on completion of a Feasibility Study, with remedial activities, if required, expected to be completed by 2012.

Operable Unit V

The sources of contamination are the Sewage Treatment plant, the Satellite Disposal Area, and the site sewage system. Contaminants include tritium, strontium-90, cesium-137, organics, and inorganics. Contaminated media at Operable Unit V include soil, ground water, surface water, surface sediment, air, flora and fauna. The extent of contamination is not fully known (some ground-water contamination has migrated offsite) and awaits the results of the Remedial Investigation/Feasibility Study for Operable Unit V which is expected to conclude in 1999. Remedial activities that may be necessary are expected to conclude in 2015.

Operable Unit VI

The primary source of contamination has been the Upland Recharge Experiment at the Upland Recharge Area/Meadow Marsh. This experiment involved study of the application of sewage to various types of environments (wetlands, meadows, forests) to evaluate sewage treatment. Sewage came from both Brookhaven National Laboratory and the town of Brookhaven and was contaminated. Contaminants include tritium and ethylene dibromide (organics, pesticides, herbicides, inorganics, other radionuclides are suspected). Contaminated media at Operable Unit VI include soil, ground water, surface water, sediment, air, flora, and fauna. The extent of contamination is unknown, pending completion of a Remedial Investigation; ground-water contamination has migrated offsite. The Remedial Investigation/Feasibility Study for Operable Unit VI is currently scheduled to begin in 2000 and conclude in 2005. Should remedial actions be required, they are expected to conclude in 2014.

Operable Unit VII

Sources of contamination are soils removed from the Hazardous Waste Management Facility and spread at other sites for landscaping purposes, the former Low-Mass Criticality Facility, and a Particle Beam "Dump." Contaminants include cesium-137 and other radionuclides. Contaminated media at Operable Unit VII include soil, ground water, surface water, sediment, air, flora, and fauna. The extent of contamination is unknown, pending completion of a remedial investigation/feasibility study which is expected to begin in 1998 and conclude in 2004. Remedial activities required as a result of the investigation will conclude in 2016.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration Assessment	12,761	2,304	790	0	0	0	0	92,035
Environmental Restoration								
Remedial Actions	13,568	16,671	7,492	598	0	0	0	205,210
Surveillance And Maintenance	35	10	1,150	1,430	1,272	311	0	21,071
Facility Decommissioning	0	0	0	1,470	980	0	0	12,251
Total	26,363	18,985	9,432	3,498	2,252	311	0	330,567

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Preliminary Assessment/Site Investigations

This task is intended to provide sufficient additional data for sites to either eliminate them from further consideration or include them in an existing operable unit for further study and remediation. At the present time, a total of 550 Areas of Environmental Interest have been identified for further study. Contamination sources and specific contaminants are unknown; they are assumed to be organics, metals, and radionuclides. The extent of contamination remains unknown pending completion of ongoing field investigation and data analysis. These investigations are expected to be complete in 1998. Additional areas of concern discovered during these investigations will be incorporated into operable units for further investigation and remediation, if appropriate.

Removal Activities

The sources of contamination include the "D" waste tanks, underground storage tanks, cesspools, the Spray Aeration Project, a project to treat volatile organics in ground water, and soils at several buildings. Contaminants include tritium, strontium-90, cobalt-60, cesium-137, actinium-228, radon-226, radon-228, thorium-232, and organics. Media are soil, ground water, and structures. The extent of contamination is unknown, pending completion of field data analysis. The assessment portion of this work has been completed. A total of seven separate removal actions will be completed by 2007.

Cost of Environmental Restoration

The estimated costs of environmental restoration at Brookhaven National Laboratory are given in the table below.

WASTE MANAGEMENT

Brookhaven National Laboratory currently manages hazardous waste, low-level radioactive waste, and low-level mixed waste. Limited treatment of waste to reduce volume and stabilize them prior to shipment to offsite facilities for treatment and disposal is expected to continue as waste is generated by on-going research and development activities. Large-scale treatment trains and onsite waste disposal facilities are not planned at this time. Handling of restoration-derived waste will be addressed within environmental restoration funding.

Major Waste Management Projects

	Five-year Averages (Thousands of Constant 1995 Dollars)*							
	FY 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Handling Facility	833	0	0	0	0	0	0	5,000

* Costs reflect a five-year average in constant 1995 dollars, except in FY 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

NOTE: These projects represent a subset of waste managements costs. Program management costs are built-in to the estimates provided.

The Environmental Management program at Brookhaven National Laboratory continues to be responsible for management of hazardous and radioactive waste generated during routine research and development activities conducted for a variety of programs managed by DOE and other Federal agencies.

Construction of the Waste Management Facility, as it is referred to by the site, began in 1995 and is expected to be complete in 1996.

The Waste Management Facility is identified in the table below as the Waste Handling Facility, the name used in the list of projects identified by Congress to be included in this report. The facility is designed to improve the effectiveness, efficiency, and environmental safeguards of Brookhaven National Laboratory's hazardous and radioactive waste management operations, and ensure compliance with Federal, State, and local environmental regulations. Upon completion of the facilities, all chemical and liquid waste handling operations and radioactive waste storage requirements will be transferred from existing facilities.

Waste Treatment

Treatment of waste is limited to size and volume reduction, consolidation, and packaging for shipment to offsite treatment and disposal facilities.

Waste Storage

Brookhaven National Laboratory stores waste in accordance with the provisions of its RCRA Part B Permit (large-quantity generator status). There are currently no plans to increase the storage times or capacities onsite.

Waste Disposal

Hazardous waste is sent to commercial facilities for disposal; low-level waste is shipped to DOE's Hanford, Washington facility for disposal; and low-level mixed waste is currently shipped to DOE's Hanford site for storage pending any required treatment.

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Treatment								
Low-Level Mixed Waste	1,020	705	705	705	705	705	653	27,013
Low-Level Waste	38	128	13	13	11	1	0	1,060
Storage and Handling								
Low-Level Waste	0	0	0	0	0	0	0	4
Hazardous Waste	7,021	4,856	4,861	4,856	4,856	4,856	3,885	182,972
Sanitary Waste	343	142	142	142	142	142	113	6,165
Total	8,421	5,831	5,721	5,716	5,714	5,704	4,651	217,212

* *Costs reflect a five-year average in constant 1995 dollars, expect in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

NUCLEAR MATERIAL AND FACILITY STABILIZATION

Brookhaven National Laboratory has not yet entered the Environmental Management facility stabilization program, but it is assumed for purposes of this report it will do so in 1996.

This report assumes the stabilization and maintenance process at Brookhaven National Laboratory will be completed by the year 2015. The 24 facilities at Brookhaven National Laboratory anticipated to enter this program include a graphite research reactor, several storage tanks including radioactive water tanks, various waste storage facilities, offices, and a warehouse. Resulting waste types will include low-level, transuranic, low-level mixed and hazardous waste.

LANDLORD FUNCTIONS

At the present time, landlord activities at Brookhaven National Laboratory are primarily the responsibility of DOE's Energy Research program. The Environmental Management program at Brookhaven National Laboratory supports landlord activities through a percentage of overhead which is calculated on an annual basis, based on programs funded at the laboratory.

PROGRAM MANAGEMENT

Program management at Brookhaven National Laboratory is limited to program planning and direct management of projects, and to waste minimization activities. Brookhaven National Laboratory does not fund any grants or Agreements-in-Principle at this time.

FUNDING AND COST INFORMATION

The following tables present current and projected funding information and major Environmental Management Program activity costs projected through 2035 for Brookhaven National Laboratory.

Nuclear Material and Facility Stabilization Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	324	437	1,038	35	0	0	0	9,491

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Program Management Cost Estimate

*Five-Yeor Averoges (Thousonds of Constont 1995 Dollors)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle **
Progrom Monogement	1,530	3,020	2,628	2,339	1,428	1,426	1,163	69,203

* Costs reflect a five-year average in constant 1995 dollars, expect in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

*Five-Year Averoges (Thousonds of Constont 1995 Dollors)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nucleor Moteriol ond Focility Stobilizotion	324	437	1,038	0	0	0	0	9,316

* Costs reflect e five-yeer everege in constant 1995 dollars, except in FY 2000, which is e six-yeer everege.

** Totel Life Cycle is the sum of ennuel costs in constent 1995 dollars.

Nondefense Funding Estimate

*Five-Yeor Averoges (Thousonds of Constont 1995 Dollors)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmentol Restorotion	26,363	18,985	9,432	3,498	2,252	311	0	330,567
Woste Monogement	8,421	5,831	5,721	5,716	5,714	5,704	4,651	217,212
Nucleor Moteriol ond Focility Stobilizotion	0	0	0	35	0	0	0	175
Progrom Monogement	1,530	3,020	2,628	2,339	1,428	1,426	1,163	69,203
Totol	36,314	27,837	17,781	11,588	9,395	7,440	5,813	617,157

* Costs reflect a five-year average in constent 1995 dollars, expect in FY 1995-2000, which is e six-year averege.

** Total Life Cycle is the sum of annuel costs in constant 1995 dollars.

Major Activity Milestones

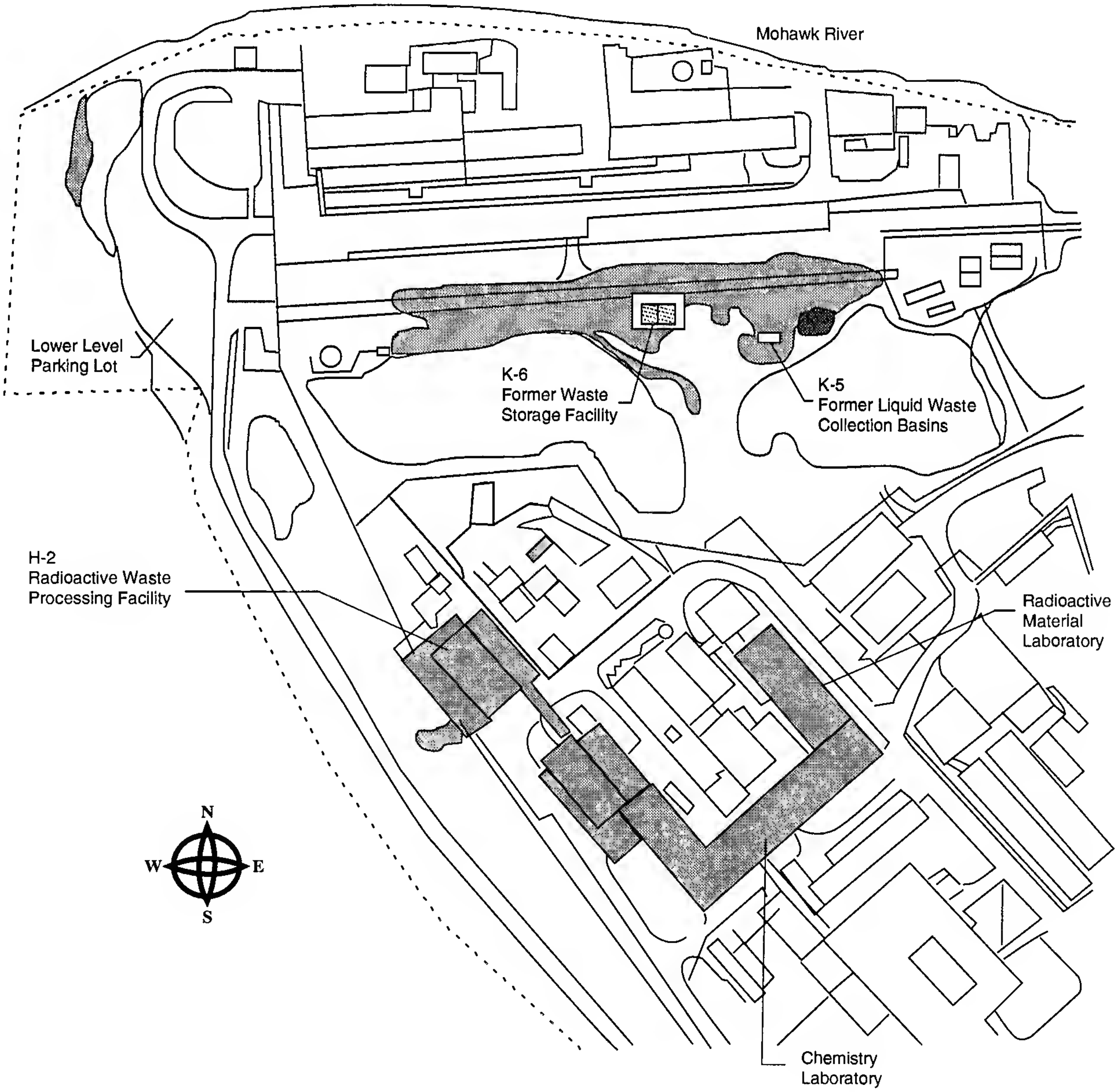
ACTIVITY	TASK	COMPLETION DATE
Environmentol Restorotion		Fiscal Year
	Complete Remedial Action	2016

For further information on this site, please contact: *Public Participation Office* *(708) 252-8796*
Public Affairs Office *(708) 252-2010*
Technical Liaison: Michael Ferrigan *(708) 252-2570*

SEPARATIONS PROCESS RESEARCH UNIT

The Separations Process Research Unit is located at the Knolls Atomic Power Laboratory operated for the Office of Naval Reactors. The site is in Schenectady, New York. The Separations Process Research Unit is managed by the Department of Energy (DOE) Chicago Operations Office.

The Separations Process Research Unit consists of four buildings and a tank farm with six 10,000-gallon, and one 5,000-gallon stainless steel tanks.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	0	0	0	0	0	3000

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	431	29,400	0	0	0	0	0	149,588

** *Costs reflect e five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The Separations Process Research Unit was constructed and operated by the Atomic Energy Commission as a pilot plant for development and testing of two chemical processes for extracting both uranium and plutonium from irradiated fuel. The Separations Process Research Unit was operated from 1950 to 1953 by the Knolls Atomic Power Laboratory, and supported operations at Hanford, Washington and at the Savannah River Site.

The Separations Process Research Unit is currently on stand-by status pending decommissioning through a signed Memorandum of Agreement with the Office of Naval Reactors. Certain non-contaminated portions of the facility are now in use by the Knolls Atomic Power Laboratory for their operations.

The current mission for the Environmental Management program at the Separations Process Research Unit is to complete decontamination and environmental restoration, including waste management activities by 2010 at the assumed funding levels. The Environmental Management program expects to decontaminate the facility to "free release" status as defined by DOE Order 5400.5. It will be verified by an independent verification contractor, and returned to the Knolls Atomic Power Laboratory.

Once the Separations Process Research Unit has been decontaminated and released to the Knolls Atomic Power Laboratory, the future use of the Separations Process Research Unit site is dependent on programs funded at the Knolls Atomic Power Laboratory. Future use of the site has not been determined at this time.

ENVIRONMENTAL RESTORATION

Previous limited cleanup performed within two of the four Separations Process Research Unit buildings included removal of liquid and

sludge from the process tanks, and limited decontamination of equipment, process lines, and interior spaces. Only residual radioactive contamination was left on the floors, walls, pipes, equipment surfaces, process pipes, tanks, and equipment. All seven Separations Process Research Unit waste tanks were drained; however, the tanks currently contain solid/ semi-solid radioactive residue. Soils immediately adjacent to the buildings and at the fringes of the parking lot are contaminated with low levels of radioactivity which resulted from storage of radioactive waste drums awaiting shipment to offsite disposal locations. Contaminants of concern include plutonium and long-lived fission products, principally strontium-90 and cesium-137. The proposed action is the decommissioning of four buildings and associated unit structures such as the tank farm, vaults, and pipe tunnels; and removal of soils contaminated by Separations Process Research Unit activities.

At present, no quantitative characterization data for hazardous or toxic waste are available. The possible presence of hazardous or toxic materials was not considered during preparation of the life-cycle cost estimate for the Separations Process Research Unit decommissioning work.

Surveillance and monitoring activities prior to decommissioning will be performed by Knolls Atomic Power Laboratory in accordance with the terms of the Memorandum of Agreement signed in September 1992 between the DOE Offices of Naval Reactors and Environmental Management.

Environmental restoration activities will involve, sequentially:

- Dismantling, packaging, and disposal of all process systems as radiological waste;
- Decontamination of remaining building surfaces, and survey of them to verify acceptance as "free release" as defined in DOE Order 5400.5;
- Dismantling of building roof, corrugated transit siding, and structural steel;
- Mechanical break-up and removal of all concrete walls, floors, and foundations; and
- Removing contaminated soil around buildings and packaging it for disposal in parallel with building demolition.

The building excavation will be surveyed to verify all radiological contamination above releasable limits, as defined by DOE Order 5400.5, has been removed. Additional excavation of contaminated material will be performed, as necessary. After verification surveys are accepted, the excavation will be backfilled and compacted to the original grade, and the site will be returned to the Knolls Atomic Power Laboratory for its use.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Facility Decommissioning	431	29,400	0	0	0	0	0	149,588

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

WASTE MANAGEMENT ACTIVITIES

Treatment, Storage and Disposal Operations

The current cost estimate for the Separations Process Research Unit assumes only low-level radioactive waste is present at the facility. This waste will be packaged and shipped for disposal at one of the approved DOE facilities. Waste not contaminated with radiological or hazardous materials will be disposed of at the local landfill. Where appropriate, waste reduction techniques will be applied before waste is shipped offsite.

Waste generated by decommissioning activities will be shipped to approved hazardous waste or radiological waste treatment and/or disposal facilities. There are no plans to construct long-term treatment, storage, or disposal facilities at the Separations Process Research Unit. All waste management requirements will be funded within the environmental restoration activities.

No onsite treatment facilities or operations are currently planned for the Separations Process Research Unit. Treatment required will be performed by either commercial or DOE facilities.

Storage and handling activities are expected to be confined to those necessary to prepare waste for shipment offsite.

All waste will be disposed of at offsite facilities. There are no plans for disposal at the Separations Process Research Unit facility.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the Separations Process Research Unit site.

LANDLORD FUNCTIONS

In accordance with the terms of the Memorandum of Agreement signed in September 1992, between the DOE Offices of Naval Reactors and Environmental Management, landlord and infrastructure costs will be borne by Knolls Atomic Power Laboratory. The essence of this agreement requires the Office of Naval Reactors provide access to all available information on the Separations Process Research Unit facility; make arrangements to vacate the Separations Process Research Unit buildings prior to the start of Environmental Management program work; remove all materials associated with the current users, provide continuing surveillance; maintenance and security until the start of Environmental Management program work; and provide utility services to the extent practical during Environmental Management program work.

PROGRAM MANAGEMENT

Program management at the Separations Process Research Unit is concerned with decontamination planning, project control, and decommissioning management. At this time, these activities are performed by Chicago Operations Office staff on a level-of-effort basis.

FUNDING AND COST INFORMATION

The following tables present current and projected funding information and major Environmental Management program activity and project costs projected through 2005 for the Separations Process Research Unit.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	431	29,400	0	0	0	0	0	149,588

* Costs reflect a five-yeer everege in constant 1995 dollars, except in FY 1995-2000, which is e six-yeer everage.

** Totel Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

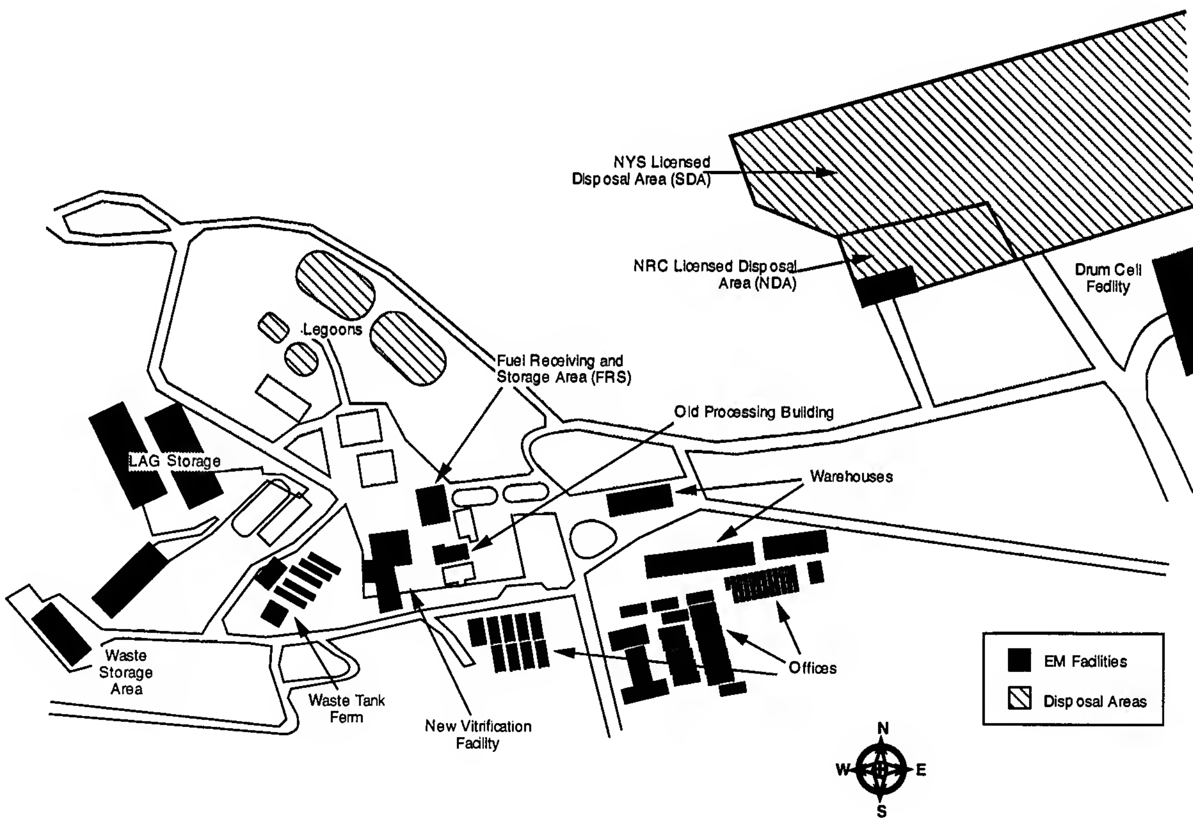
ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Complete Decontamination	2010

For further information on this site, please contact:

Public Participation Office	(708) 252-8796
Public Affairs Office	(708) 252-2010
Technical Liaison: Michael Ferrigan	(708) 252-2570

WEST VALLEY DEMONSTRATION PROJECT

The West Valley Demonstration Project is sited on a 3,300-acre tract 30 miles south of Buffalo, New York. This site is also the location of the Western New York Nuclear Services Center. The West Valley Demonstration Project occupies approximately 230 acres of this New York State-owned property. The Department of Energy (DOE) manages West Valley Demonstration Project oversight responsibilities through the DOE Area Office located onsite. This office reports to the Department's Ohio Field Office located in Miamisburg, Ohio.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Waste Management	127,100	137,500	140,200	149,100	156,800	164,300

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Waste Management	135,450	118,240	93,440	108,000	125,440	145,280	0	3,754,705

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-yeer average.*

*** *Total Life Cycle is the sum of annuel costs in constent 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

There is no historic Department of Energy mission at West Valley or the Western New York Nuclear Services Center. From 1966 to 1972, Nuclear Fuel Services, Inc. operated a nuclear fuel reprocessing plant at the Western New York Nuclear Services Center under contract to the State of New York in a commercial venture. The plant, which reprocessed uranium and plutonium from spent nuclear fuel, generated approximately 600,000 gallons of liquid high-level waste stored in underground tanks. In 1972, nuclear fuel reprocessing operations were discontinued in accordance with provisions in the contract. The State of New York remained as the owner of the site.

On October 1, 1980, Congress passed the West Valley Demonstration Project Act (the "Act")[Public Law 96-368]. The Act charged DOE with the responsibility for demonstrating the technology for the safe solidification and cleanup of the high-level waste and facilities used during cleanup. Additionally, the Act required the Department to develop containers suitable for the permanent disposal of the solidified high-level radioactive waste and to transport the waste to an appropriate Federal repository for permanent disposal.

By provisions in the Act, low-level and transuranic waste produced in the West Valley Demonstration Project are to be disposed of under applicable licensing requirements. Further, the tanks and other facilities in which the solidified high-level radioactive waste was stored, the facilities used in the solidification of the waste, and any material and hardware used in connection with the demonstration project are to be decommissioned.

After evaluation of alternatives presented in an environmental impact statement, DOE selected vitrification as the treatment process to stabilize the high-level waste for ultimate disposal. New York State, through its Energy Research and Development Authority, cooperates in the West Valley Demonstration Project and currently

contributes approximately 10 percent of the project's costs. During Phase I, the high-level waste will be immobilized in borosilicate glass and stored onsite, pending completion of a Spent Nuclear Fuel and High-Level Waste Programmatic Environmental Impact Statement. During Phase II, the project facilities used will be decommissioned, following a review of alternative actions in a West Valley site-specific Environmental Impact Statement and the issuance of a record of decision.

Currently, the principal activities at the West Valley Demonstration Project are centered on the construction, testing, and startup engineering and operations associated with the vitrification facility. Vitrification process operations are scheduled to commence in January 1996 and proceed through the third quarter of FY 1998, at which time the 600,000 gallons of high-level waste would be solidified.

In addition to the highly radioactive liquid waste stored at the West Valley site, there are 125 irradiated fuel elements owned by DOE contained in a water-filled storage pool while awaiting disposition. Final disposition of the 125 fuel elements is not a part of the West Valley Demonstration Project, but disposition of these fuel elements is included in the final Spent Nuclear Fuel and High-Level Waste Programmatic Environmental Impact Statement and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Environmental Impact Statement.

Upon fulfillment of the requirements of the Act, and after its responsibilities with respect to the stored fuel elements have been met, DOE's obligations at the site will have been completed. Future disposition of the site, under Nuclear Regulatory Commission (NRC) license, will be the responsibility of the State of New York.

ENVIRONMENTAL RESTORATION

West Valley site contamination is the result of the commercially-conducted fuel reprocessing operations. DOE is only responsible for the cleanup of facilities used during the demonstration of the vitrification process. When this mission is completed, the Department will turn the project site over to New York State for final disposition.

DOE and the State of New York are jointly preparing an environmental impact statement to address project completion and final closure alternatives and cleanup options for the site.

Resource Conservation and Recovery Act (RCRA) facility investigations are being conducted to ascertain the nature and extent of releases of hazardous waste or constituents.

Several alternatives are being considered for site closure under the Environmental Impact Statement Record of Decision. The three "Action" Alternatives (including DOE and New York State Energy Research and Development Authority responsibilities) are defined as follows:

I. Removal and Release to Allow Unrestricted Use – The entire site would be decontaminated as needed. All structures, both permanent and temporary, would be demolished and removed. All radioactive, mixed, and hazardous waste generated, exhumed, or removed, except the high-level waste heel, would be transferred for centralized onsite characterization, treatment, and packaging, followed by offsite disposal. The site would be returned to a natural state and would be eligible for unrestricted release.

II. Removal, On-Premises Waste Storage, and Release to Allow Unrestricted Use – For Alternative II, the entire site would be decontaminated, as needed. All structures would be demolished and removed. All radioactive, mixed, and hazardous waste generated, exhumed, or removed, except the high-level waste heel, would be transferred for centralized onsite characterization, treatment, and packaging, followed by onsite storage. The site, except for the storage area, would be returned to a natural state and would be eligible for unrestricted release. The storage area and an existing drum cell would be provided with a long-term continuous maintenance and monitoring program for an indefinite period.

III. In-Place Closure and On-Premises Low-Level Waste Disposal – For this site-wide alternative, two approaches have been considered:

   a. Monolith – Decontamination and fixation would be performed. The Process Building, the High-Level Waste Tank Farm, and the Vitrification Facility would be backfilled with low-density concrete. Any radioactive waste generated would be disposed of in the backfilled buildings. Nuclear Regulatory Commission-licensed Disposal Area and State-Licensed Disposal Area burial grounds would be stabilized with the waste left in place. Waste currently stored onsite in the Chemical Process Cell Waste Storage Area and the Lag Storage Area would be placed inside the Process Building and/or the Vitrification Facility prior to backfilling. A long-term continuous monitoring and maintenance program would be instituted.

   b. Capped Rubble Pile – Facilities would receive decontamination and fixation prior to dismantlement. This would require special equipment and the construction of a new confinement structure around the Process Building and the Vitrification Facility to control the spread of radioactivity during dismantlement and minimize exposure to workers. Rubble would remain in place and would be capped with clean rubble and concrete. Nuclear Regulatory Commission-licensed Disposal Area and State-licensed Disposal Area burial grounds would be stabilized with the waste left in place. Any radioactive waste generated would be disposed of within an onsite radioactive waste disposal facility. A long-term continuous monitoring and maintenance program would be instituted.

Note: There are two paths, and therefore, two cost estimates for Option III. This provides for a total of four cost estimates used for this project.

WASTE MANAGEMENT

All site activities, including high-level waste solidification, decontamination, decommissioning, RCRA corrective measures, and other necessary site remedial activities, are categorized as waste management operations. An environmental impact statement is being drafted for the completion of the West Valley Demonstration Project and final site closure.

The record of decision may include the selection of one of the alternatives or a combination of several. The budgetary requirements for completion of the West Valley Demonstration Project are an average of the

estimated costs of the three "Action" Alternatives. These alternatives present differing actions to address the different areas of the site:

I. The process building, including its equipment, would be disassembled and removed; or entombed in concrete; or disassembled, grouted, and capped.

II. The High-Level Waste Tank Farm and the Vitrification Facility would be disassembled and removed; or entombed in concrete; or grouted and capped.

III. a. Disposal areas, such as the Nuclear Regulatory Commission Disposal Area and a construction landfill, may be exhumed, with waste either sent offsite for disposal or kept onsite in monitored retrievable storage.

b. Under this option, the facilities would be reduced to rubble; the rubble would remain in place and would be capped with clean rubble and concrete.

In similar fashion, the alternatives will evaluate actions for the balance of the support facilities now in place and will evaluate build/no build actions for new waste storage and handling facilities.

Categorization of future waste activities includes waste treatment, waste storage/handling, and waste disposal. These three waste activity categories are described as follows:

- Waste Treatment. Vitrification of high-level waste will be performed in accordance with the Phase I Environmental Impact Statement, with planned completion in 1998. The Phase II Environmental Impact Statement will define treatment and disposal options for low-level, transuranic, and high-level waste residuals.
- Waste Storage/Handling. Solidified high-level waste will be stored onsite until a Federal repository or other offsite storage and disposal option is available. Low-level waste will be volume-reduced, repackaged, and stored disposal-ready, pending the Environmental Impact Statement Record of Decision.
- Waste Disposal. Low-level class A waste will be disposed on a case-by-case basis as disposal options become available.

All other radioactive waste will be retained pending receipt of the Environmental Impact Statement Record of Decision. Hazardous waste will be disposed in accordance with regulatory requirements.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Decommissioning	135,450	118,240	93,440	108,000	125,440	145,280	0	3,754,705

* Costs reflect a fiva-yaar avaraga in constant 1995 dollars, except in FY 1995-2000, which is a six-yaar avaraga.

** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the West Valley Demonstration Project site.

LANDLORD FUNCTIONS

There will be no long-term DOE presence or future mission at the West Valley Demonstration Project. Upon completion of the demonstration, operational responsibility will be returned to the State of New York for final disposition. As such, there are no DOE landlord activities associated with the project.

PROGRAM MANAGEMENT

Program Management costs are considered part of the overall demonstration project costs and have been included in the waste management category in the respective tables.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the West Valley Demonstration Project.

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Waste Management	135,450	118,240	93,440	108,000	125,440	145,280	0	3,754,705

* *Costs reflect a five-year everege in constant 1995 dollars, except in FY 1995-2000, which is a six-year everege.*

** *Total Life Cycle is the sum of ennuel costs in constent 1995 dollars.*

For further information on this site, please contact:

Public Participation Office	*(513) 865-3968*
Public Affairs Office	*(513) 865-3968*
Technical Liaison: Dan Sullivan	*(716) 942-4016*

NEW YORK FUSRAP SITES

Ashland Oil #1 and #2, Bliss and Laughlin Steel, Colonie, Linde Air Products Niagara Falls Storage Site, and Seaway Industrial Park constitute the New York sites currently within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and the Atomic Energy Commission sites to reevaluate their radiological condition and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 states and is funded through the Oak Ridge Operations Office. The model used to estimate costs for this report provides one cost for all of the FUSRAP sites located in each state. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department of Energy (DOE) are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
New York-FUSRAP	20,800	28,930	36,200	22,880	18,300	24,760

* *Costs for FY 1995 reflect Congressionel Appropriation, costs for FY 1996 reflect EM budgat submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for sheded eraa assume 3% ennuel inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
New York-FUSRAP	25,209	16,956	13,890	12,911	0	0	0	370,041

** *Costs raflact a fiva-yaar avaraga in constant 1995 dollars, excapt in FY 1995-2000, which is a six-yaar avarage.*

*** *Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

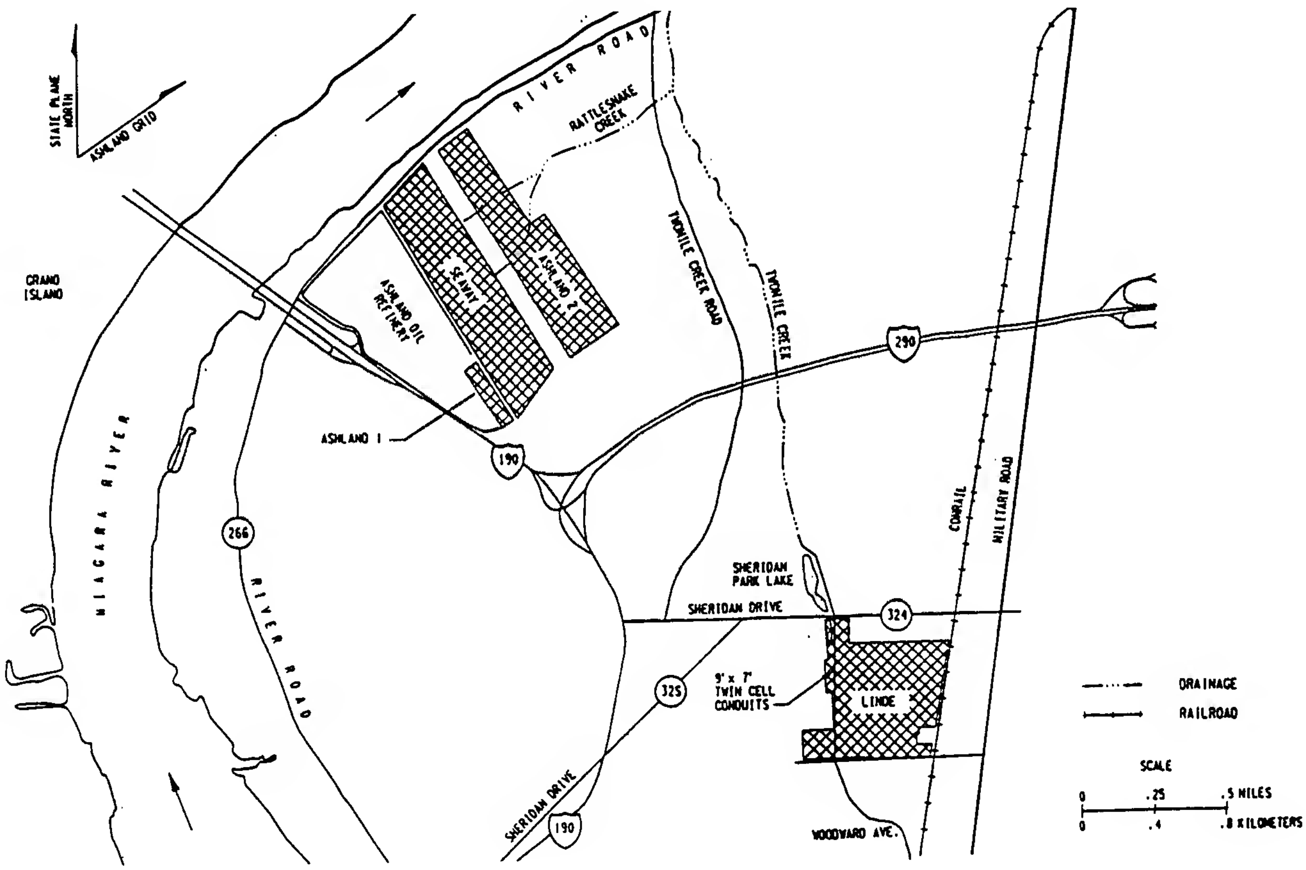
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmentol Restorotion	25,209	16,956	13,890	12,911	0	0	0	370,041

* *Costs raflact a fiva-yaar avarage in constant 1995 dollars, excapt in FY 1995-2000, which is a six-yaar avaraga.*

** *Total Lifa Cycle is tha sum of annual costs in constent 1995 dollars.*

ASHLAND OIL #1
(Formerly Utilized Sites Remedial Action Program)

Ashland Oil 1 is a 10.8-acre site that is part of the former Ashland Oil Company refinery in Tonawanda, New York.



PAST, PRESENT, AND FUTURE MISSIONS

In 1943, 11 acres known as the Haist property were leased for the Federal Government by the Manhattan Engineer District. The Manhattan Engineer District purchased the property from E. Haist and co-owners in 1944. The tract served as a disposal site for uranium ore refinery residues generated by Linde Air Products (a division of Union Carbide Corporation) in Tonawanda, New York. Residues composed essentially of low-grade uranium ore tailings were deposited on the former Haist property from 1944 to 1946. Approximately 8,000 tons of residues containing 0.54 percent uranium were spread out over roughly two-thirds of the site. In 1949, the site was assigned to the jurisdiction of the General Services Administration. In 1958, following a radiological survey, the Atomic Energy Commission released the property for use with no radiological restrictions. In 1960, the General Services Administration transferred ownership of the property to the Ashland Oil Company.

The Ashland Oil 1, Ashland Oil 2, the former Linde Air Products, and Seaway Industrial Park sites are included in the Tonawanda integrated environmental documentation process to comply with requirements of National Environmental Policy Act and Comprehensive Environmental Response, Compensation and Liability Act. Future use of this site depends on resolution of the record of decision for Tonawanda. Options range from construction of a local disposal cell (for all 4 Tonawanda sites) to shipment of all waste to another disposal site.

ENVIRONMENTAL RESTORATION

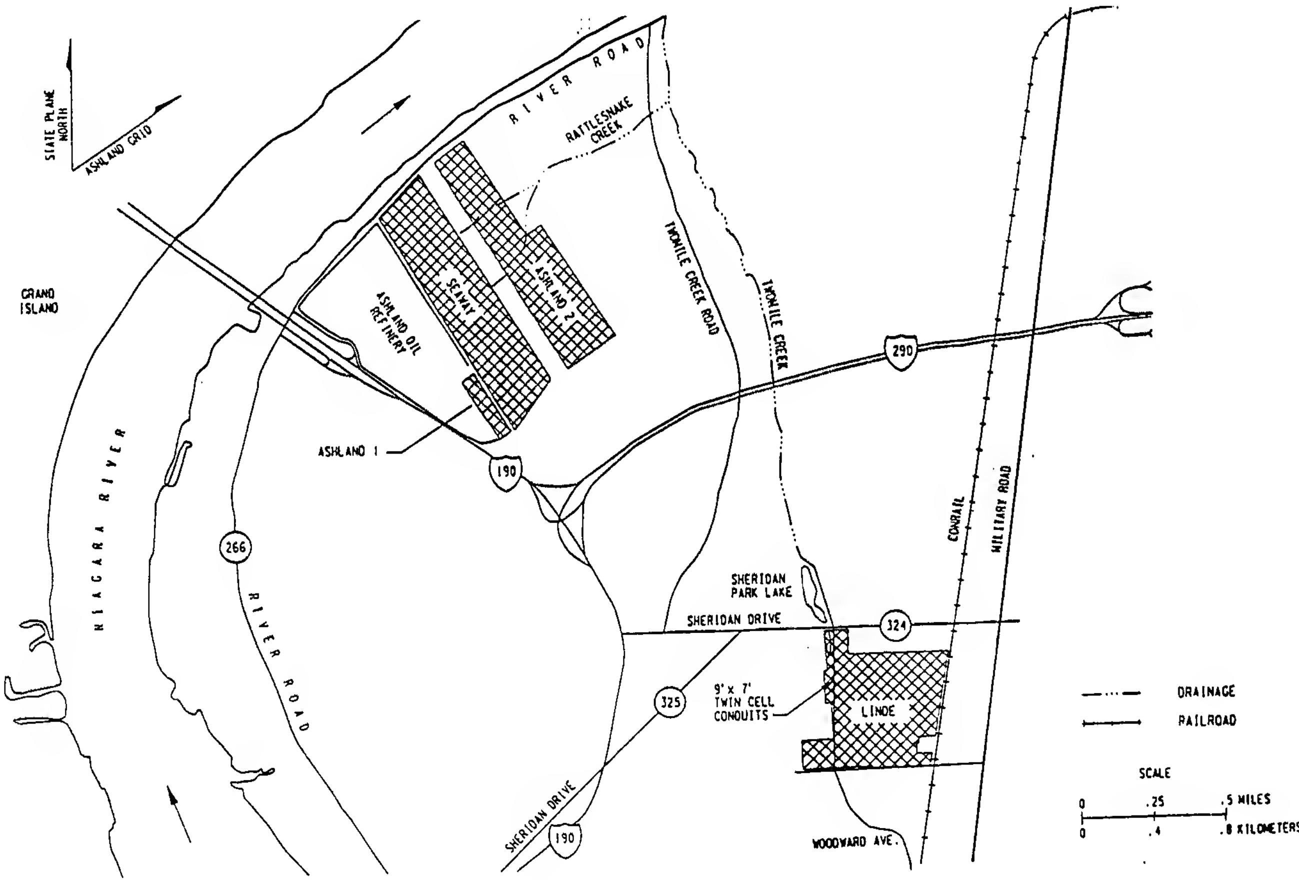
In 1974, contaminated material was transported from the Ashland Oil 1 site to the Seaway Industrial Park. Remedial action is expected to be complete by 1999.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

ASHLAND OIL #2
(Formerly Utilized Sites Remedial Action Program)

Ashland Oil 2 is a 100-acre site owned by the Ashland Oil Company located in Tonawanda, New York.



PAST, PRESENT, AND FUTURE MISSIONS

Ashland Oil 2 is associated with the integrated process for the Tonawanda sites. Since 1974, the Ashland Oil Company has transported an unknown amount of the uranium residues from the Ashland Oil 1 site to the Ashland Oil 2 site. Contaminated soils cover approximately 100 acres. The Ashland Oil 2 property is vacant and is covered by vegetation. No commercial operations are currently being conducted.

Future use of this site depends on resolution of the record of decision for Tonawanda. Options range from construction of a local disposal cell (for all 4 Tonawanda sites) to shipment of all waste to another disposal site.

ENVIRONMENTAL RESTORATION

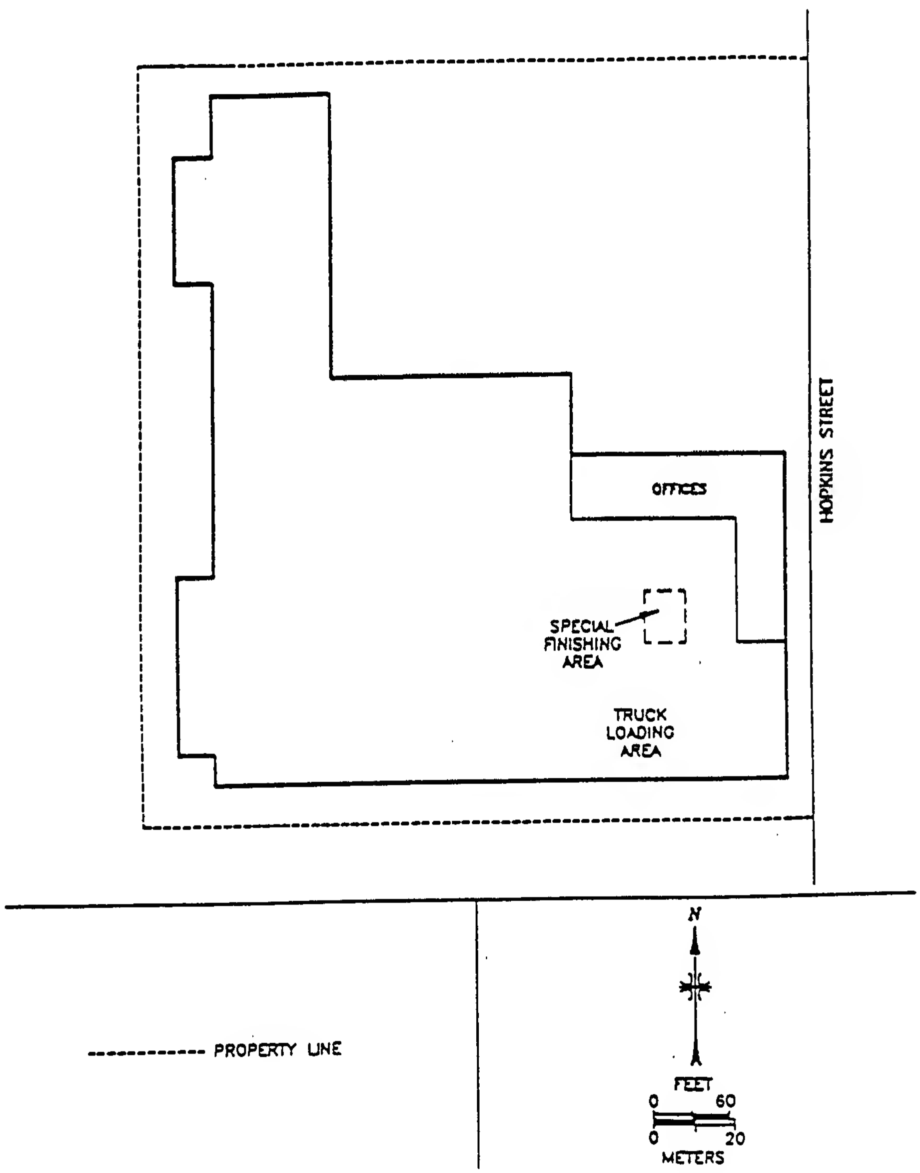
Contaminated soil excavated during Ashland Oil 1 construction activities in 1974 was deposited at Ashland Oil 2 for disposal. The waste consists of soil contaminated with low-grade uranium residues. The waste volume is estimated to be 52,100 cubic yards. Remedial action is expected to be complete by 1999.

For further information on this site, please contact:

Public Participation Office	*(615) 576-159*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

BLISS & LAUGHLIN STEEL
(Formerly Utilized Sites Remedial Action Program)

The former Bliss and Laughlin facility is located at 110 Hopkins Street in Buffalo, New York.



PAST, PRESENT, AND FUTURE MISSIONS

During the 1950's, Bliss & Laughlin Steel Company performed uranium matching and rod straightening operations for the Atomic Energy Commission. Bliss & Laughlin Steel Company shipped their products to other manufacturers and their waste to the Atomic Energy Commission. A small degree of uranium contamination was found in approximately 100 square feet of the floor. The less than one-acre site is currently an active steel plant.

Future use of this site depends on the resolution of the decision document for cleaning up the site. Options range from no action to removal of all material and shipment for disposal offsite.

ENVIRONMENTAL RESTORATION

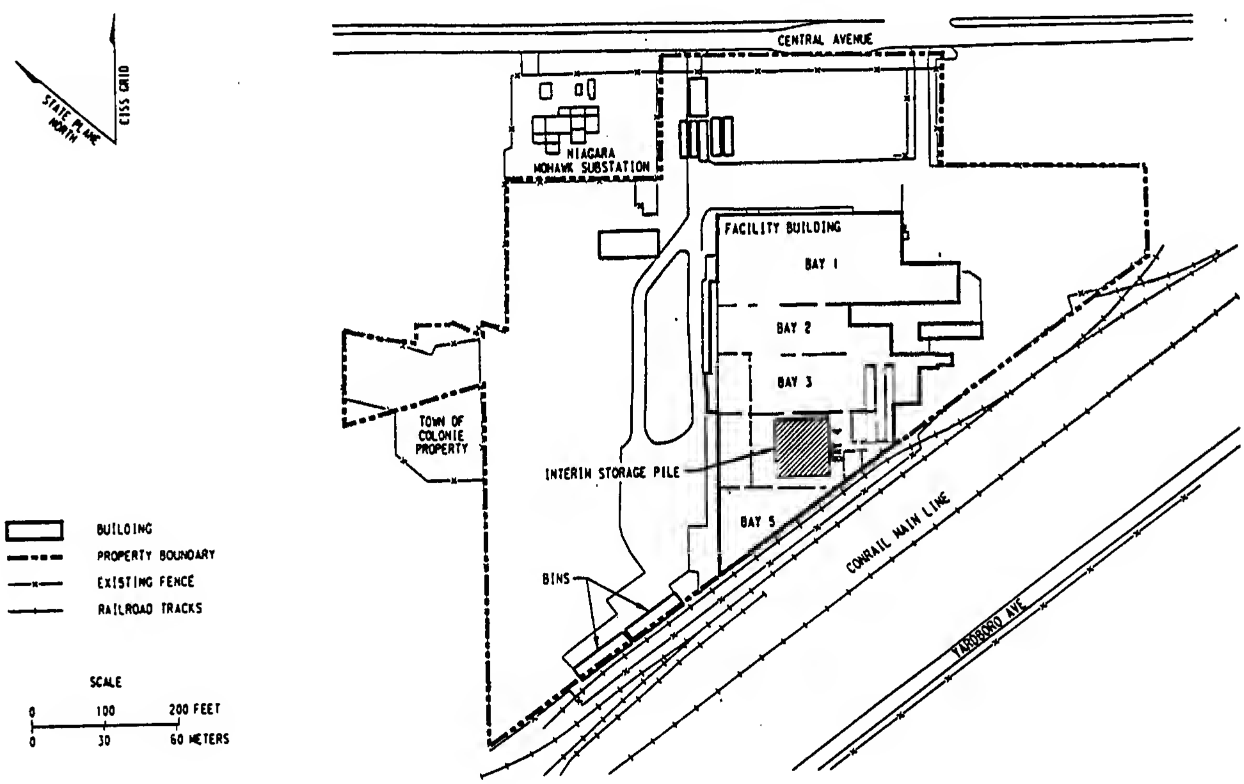
The site consists of a single large building with a floor area of 12,000 square meters. Since machining operations began in the 1950's, only minor changes have been made to the main structure and equipment has been rearranged or replaced to varying degrees. The area where uranium machining is suspected to have taken place occupies about 300 square meters of floor space in the southeast portion of the building. The contamination involves low-level radioactive waste containing trace amounts of uranium. Approximately 20 cubic yards of contaminated debris will be generated during remediation.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

COLONIE SITE
(Formerly Utilized Sites Remedial Action Program)

The Colonie Site is located on Central Avenue in a mixed light-industrial, commercial, and residential area within Colonie and adjacent to Albany, New York.



PAST, PRESENT, AND FUTURE MISSIONS

The Colonie Site was formerly owned by National Lead Industries, Inc., but was assigned to the Formerly Utilized Sites Remedial Action Program (FUSRAP) by Congressional action in 1983. The 11-acre site consists of plant buildings with process equipment for uranium material and is enclosed by a chain-link fence. The main building covers 3 acres (120,000 square feet). All of the former National Lead Industries plant buildings and some of the grounds are radioactively contaminated. There are 56 vicinity properties. In the 1950's, National Lead Industries, Inc. began manufacturing uranium products at Colonie under a license issued by the Atomic Energy Commission. Work at the plant included fabrication of slightly enriched uranium fuel elements, chemical processing of non-irradiated, slightly enriched uranium scrap, and fabrication of shielding components, ballast weights, and projectiles from depleted uranium.

Future use of this site depends on the resolution of the decision document for cleaning up the balance of the site. Options range from no action to removal of all materials to disposal offsite.

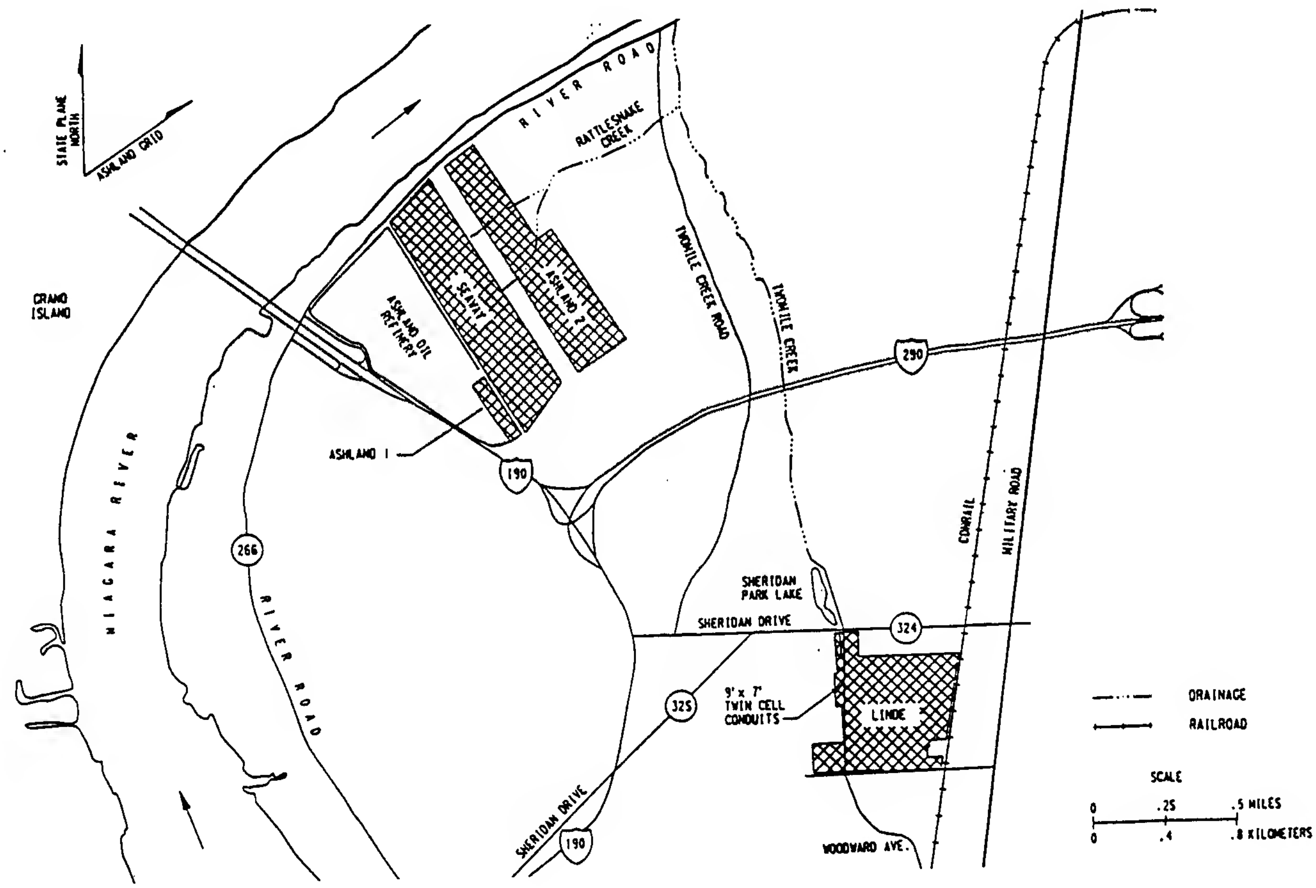
ENVIRONMENTAL RESTORATION

All but three of the vicinity properties have been remediated. The main building at the site is currently undergoing decontamination and demolition. The waste volume for soils is estimated to be 52,500 cubic yards and consists of uranium waste residues and some heavy metals. The building waste volume includes over 2.6 million pounds of metal and 5,900 cubic yards of building rubble. The remediation is anticipated to be complete in FY 1998.

For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*

LINDE AIR PRODUCTS
(Formerly Utilized Sites Remedial Action Program)

The former Linde Air Products (now owned by Praxair, Inc.) property in Tonawanda is about 135 acres and is bordered on the north and east by other industrial and residential properties; on the south by small businesses, industries, and undeveloped land; and on the west by a golf course. The Ashland Oil 1, Ashland Oil 2, and Seaway Industrial Park sites are nearby.



PAST, PRESENT, AND FUTURE MISSIONS

Linde performed uranium separation operations and ore processing from 1940 through 1948. Wastes were consolidated on site. Five buildings were involved in uranium separation and conversion processes. Building 14 was used as a pilot plant for uranium separation and is currently used for fabrication facilities, research laboratories, and offices. Building 30 was the primary uranium processing building and has been converted to a shipping and receiving warehouse. Building 31, used in the uranium separation process, is now used for maintenance and offices. Building 37, used in the uranium separation process, was demolished by the site owner. Building 38, currently used for storage, was used for uranium dioxide fluorination to produce uranium tetrafluoride. Building 90 is a new building constructed in an area where tailings were removed from the site at the close of operations.

Future use of this site depends on resolution of the record of decision for Tonawanda. Options range from construction of a local disposal cell (for all 4 Tonawanda sites) to shipment of all waste to another disposal site.

ENVIRONMENTAL RESTORATION

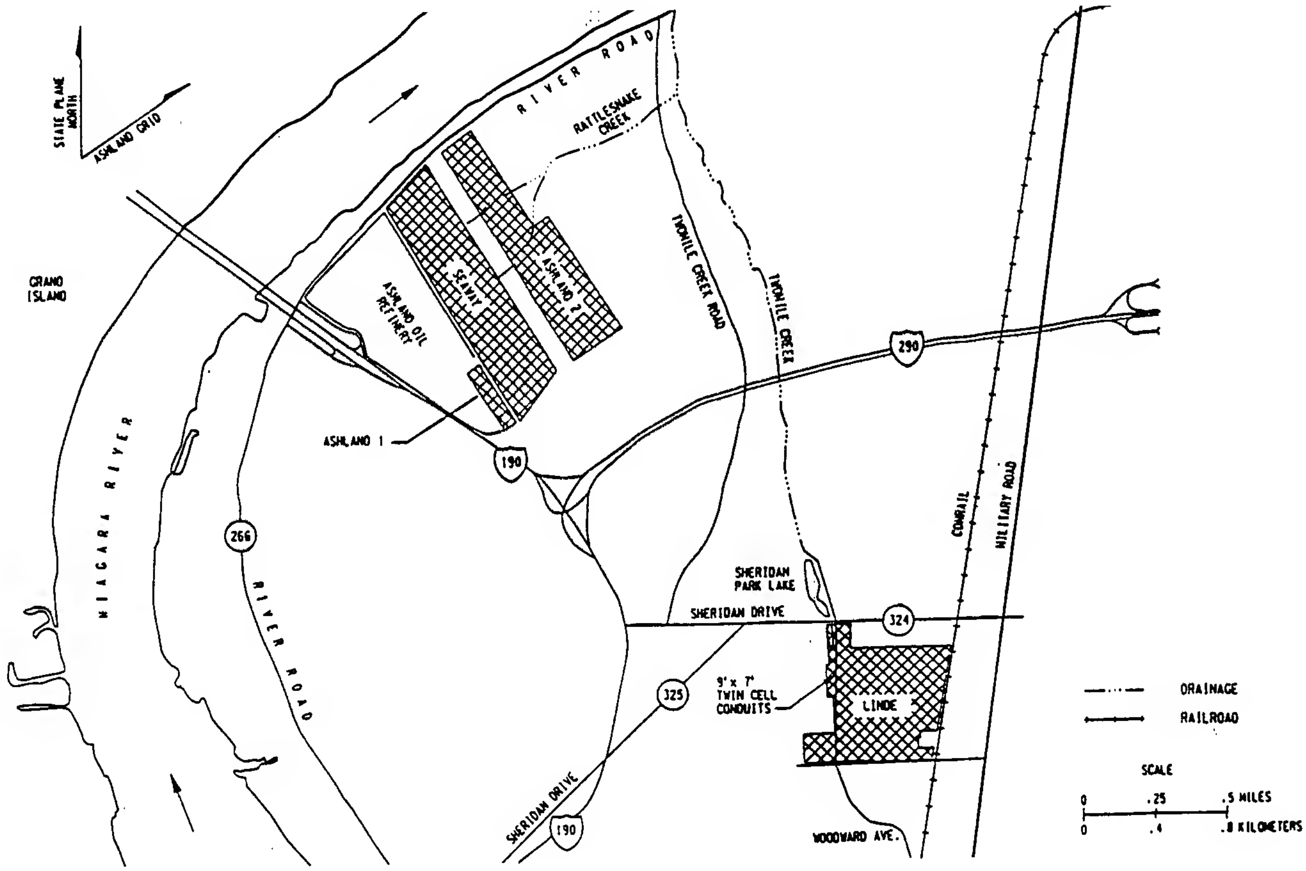
Residual low-level contaminated soil was removed from the construction area and placed in two wind rows on the site. These piles of contaminated soil were subsequently consolidated in a pile west of Building 90. The waste volume is estimated to be 70,000 cubic yards. Wastes are the tailings from the processing or ores containing uranium. Remedial action is expected to be complete by 1999.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

SEAWAY INDUSTRIAL PARK
(Formerly Utilized Sites Remedial Action Program)

The Seaway Industrial Park Site covers approximately 93 acres and is located in Tonawanda, New York. This site is in an industrial area and is bounded by Ashland Oil Company, Inc. and other industries.



PAST, PRESENT, AND FUTURE MISSIONS

In 1974, some of the residues deposited on the Ashland Oil 1 property were excavated by the Ashland Oil Company. The residues were transported to the Seaway Industrial Park, which covers 100 acres, and deposited into three areas, A, B, and C. The present use of the Seaway industrial park is as a sanitary landfill.

Future use of this site depends on resolution of the record of decision for Tonawanda. Options range from construction of a local waste disposal cell (for all 4 Tonawanda sites) to shipment of all waste to another disposal site.

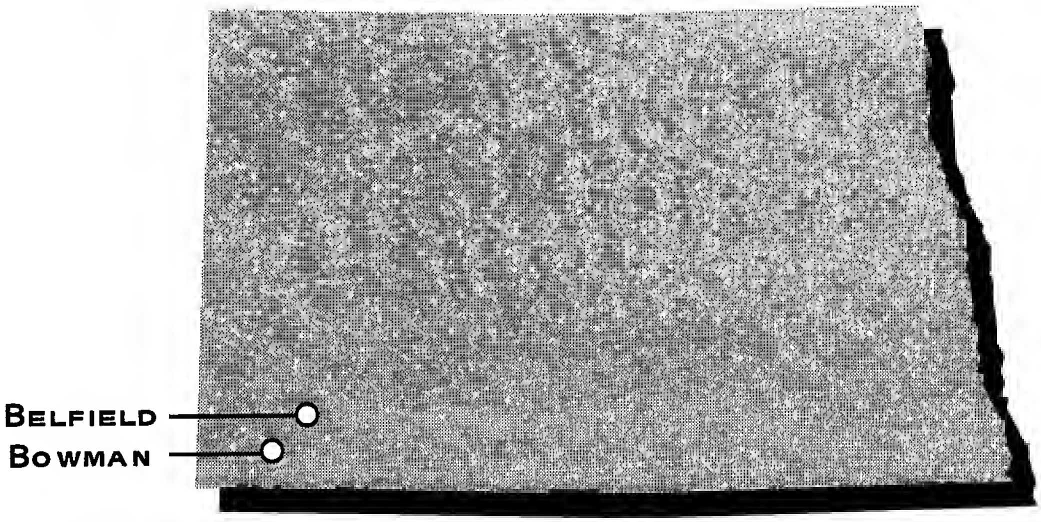
ENVIRONMENTAL RESTORATION

Approximately 6,000 cubic yards of contaminated soil, containing mostly low-grade uranium ore tailings, were disposed of at the Seaway sanitary landfill after being excavated from Ashland Oil 1 in 1974. The waste volume is estimated to be 117,000 cubic yards. Some of the waste is covered with about 40 feet of soil and refuse. Contamination is limited to about 14 acres of the site.

Remedial action is expected to be complete by 1999.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*



NORTH DAKOTA

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
North Dokota - UMTRA	280	20,470	1,850	800	160	190

* Costs for FY 1995 raflect Congrassional Appropriation, costs for FY 1996 raflact EM budgat submission, costs for FY 1997-2000 raflact Budgat Shortfall Scanario, costs for shadad araa assuma 3% annual inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
North Dokota - UMTRA	4,204	516	0	0	0	0	0	27,805

** Costs raflact a fiva-yaar avaraga in constant 1995 dollars, axcapt in FY 1995 - 2000, which is a six-yaar avaraga.

*** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.

NORTH DAKOTA UMTRA SITES

The Belfield site and the Bowman site are 2 of 24 uranium mill processing sites designated by the Uranium Mill Tailings Radiation Control Act for the U.S. Deparment of Energy (DOE) remediation. Most uranium ore mined in the United States in the 1960's was processed by private firms for the Atomic Energy Commission, a predecessor of DOE. The Act was passed in 1978 in response to public concerns regarding potential health hazards from long-term exposure to uranium mill tailings. It authorized DOE to stabilize, dispose of, and control uranium mill tailings and other contaminated material at 24 uranium mill processing sites and vicinity properties.

Uranium Mill Tailings Remedial Action (UMTRA) activities are funded through the Albuquerque Operations Office.

The model used as an estimation tool for this report provides costs for each of the UMTRA sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to DOE are provided for within the scope of environmental restoration. There are no UMTRA sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of UMTRA and associated costs, see the UMTRA Site Summary found in the New Mexico section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	280	20,470	1,850	800	160	190

* *Costs for FY 1995 reflect Congressionel Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for sheded erea assume 3% ennual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)*

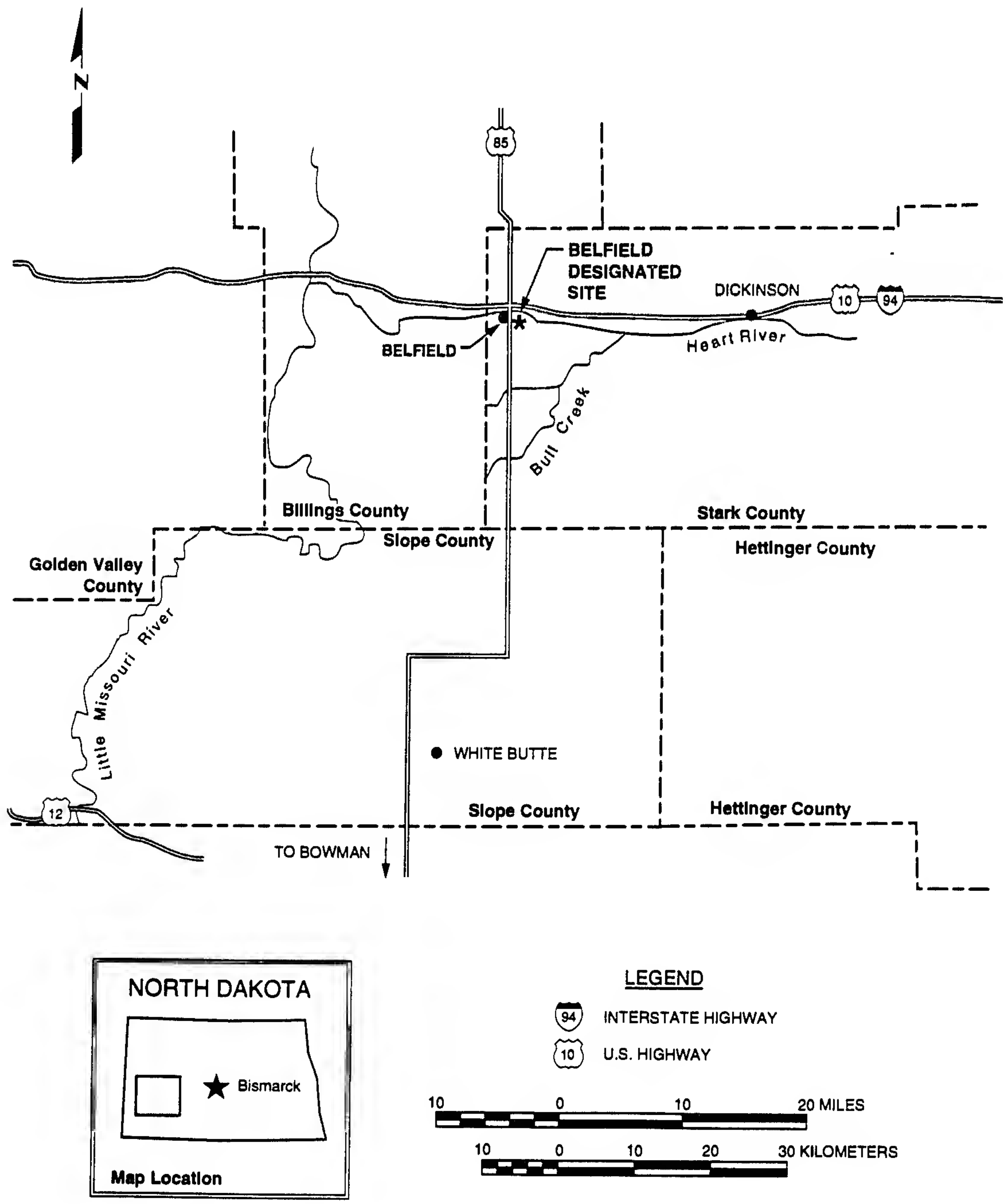
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	4,204	516	0	0	0	0	0	27,805

** *Costs reflect e five-yeer everage in constant 1995 dollers, except in FY 1995 - 2000, which is e six-year average.*

*** *Totel Life Cycle is the sum of ennual costs in constent 1995 dollars.*

BELFIELD AND BOWMAN
(Uranium Mill Tailings Remedial Action Project)

The Belfield site is located in southwestern North Dakota, one mile southeast of the Town of Belfield in Stark County. The former ashing site occupies 10.7 acres. The Bowman site is located seven miles west of Bowman, North Dakota. The site is located on nearly level land near the head of Spring Creek, a part of the Grand River drainage basin. The Bowman site is approximately 12 acres.



PAST, PRESENT, AND FUTURE MISSIONS

Union Carbide Corporation leased the Belfield site for an ashing operation from 1964 to 1966. Dakota Industries leased the site in 1968 for clay calcination operations to produce cat litter. In 1972, LP Anderson Construction Company of Miles City, Montana, purchased one of the buildings and leased a portion of the site for construction equipment, maintenance, and storage. Another building on the site housed a honey processing operation. Cenex Exploration, an agricultural cooperative, maintains an oil and gas exploration office and shop adjacent to the site. There is no discernible pile remaining.

During ashing operations from 1963 to 1967, the Bowman site was owned by Viola Soderstrom, who leased the property to Kermac Nuclear Fuels Corporation, a subsidiary of Kerr-McGee Oil Industries. The property was subsequently purchased by the Milwaukee Road and leased by Bowman Grain, Inc. Ashing operations were suspended in February 1967, and the Atomic Energy Commission Source Material License was terminated on May 16, 1967.

Site use will remain restricted until surface remediation and ground-water compliance is achieved.

ENVIRONMENTAL RESTORATION

No mill tailings pond or pile is present because the ash was shipped to another location. However, activities at these sites have resulted in contaminated soil, gravel, and rubble, as well as contaminated windblown soil. All activity has been suspended pending resolution of State funding issues. The costs for environmental restoration projects at this site are shown in the following table. All funding is from nondefense sources.

Environmental Restoration Projects

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
UMTRA-Ground Water - North Dakota	235	516	0	0	0	0	0	3,990
UMTRA-Soils - North Dakota	3,969	0	0	0	0	0	0	23,815
Total	4,204	516	0	0	0	0	0	27,805

*Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

**Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

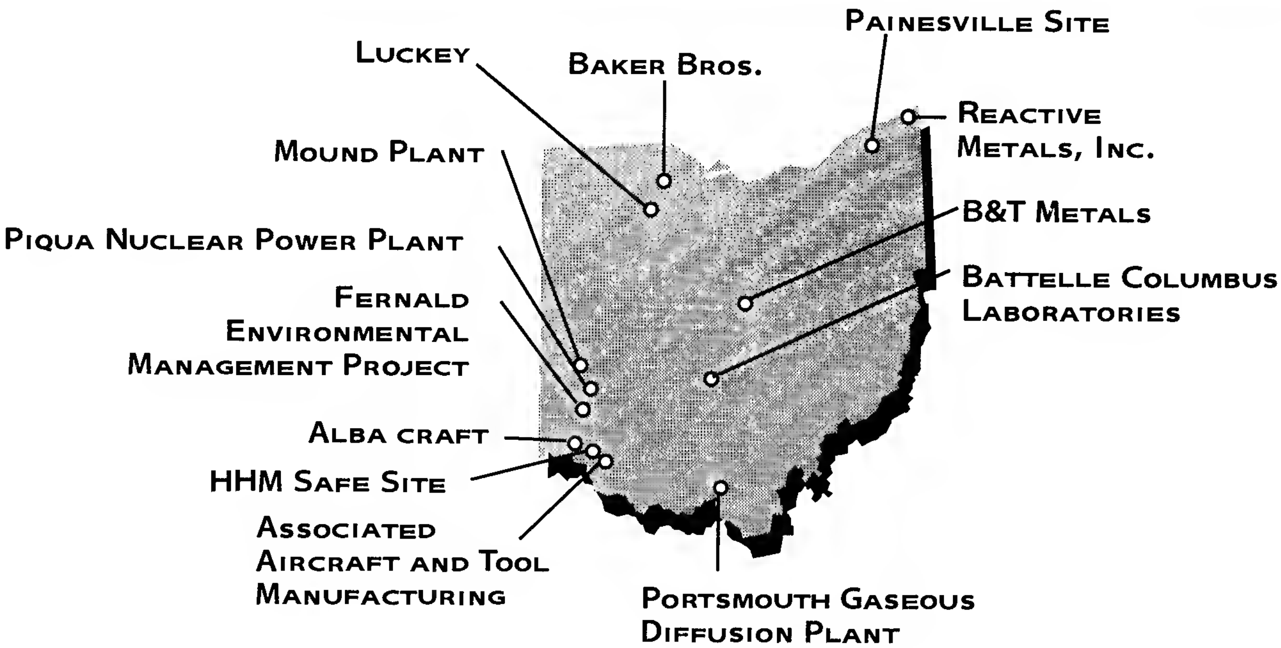
	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	4,204	516	0	0	0	0	0	27,805

*Costs reflect e five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year averege.

**Total Life Cycle is the sum of annual costs in constant 1995 dollars.

For further information on this site, please contact :

Public Participation Office	*(505) 845-5951*
Public Affairs Office	*(505) 845-6202*
Technical Liaison: Jody Metcalf	*(505) 845-6146*


Painesville Site
Luckey
Baker Bros.
Reactive Metals, Inc.
Mound Plant
B&T Metals
Piqua Nuclear Power Plant
Battelle Columbus Laboratories
Fernald Environmental Management Project
Alba craft
HHM Safe Site
Associated Aircraft and Tool Manufacturing
Portsmouth Gaseous Diffusion Plant

OHIO

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Battelle-Columbus Laboratories	19,155	21,105	22,105	23,302	22,497	19,285
Fernald Environmental Management	308,600	307,100	301,800	325,600	310,200	473,700
Mound Plant	45,238	113,978	130,456	132,352	133,874	146,158
Piqua Nuclear Power Facility	12	12	13	14	14	14
Portsmouth Gaseous Diffusion Plant	75,500	86,500	80,000	105,100	102,700	119,500
Reactive Metals, Co., Extrusion Plant	6,590	11,124	13,102	13,888	14,721	15,163
Ohio – FUSRAP	10,600	4,660	12,250	10,980	16,260	23,290
Total - Ohio	465,695	544,479	559,726	611,286	600,266	797,110

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenerio, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Battelle-Columbus Laboratories	19,968	3,392	0	0	0	0	0
Fernald Environmental Management	303,558	392,948	169,914	88,772	23,586	19,606	14,612
Mound Plant	117,674	86,061	104,538	59,845	31,342	5,474	29
Piqua Nuclear Power Facility	12	16	0	0	0	0	0
Portsmouth Gaseous Diffusion Plant	87,567	88,867	152,733	266,232	257,364	294,295	279,074
Reactive Metals, Co., Extrusion Plant	9,588	12,890	7,523	68	474	749	0
Ohio – FUSRAP	12,955	18,773	19,520	0	0	0	0
Total - Ohio	551,323	602,947	454,227	414,918	312,766	320,124	293,715

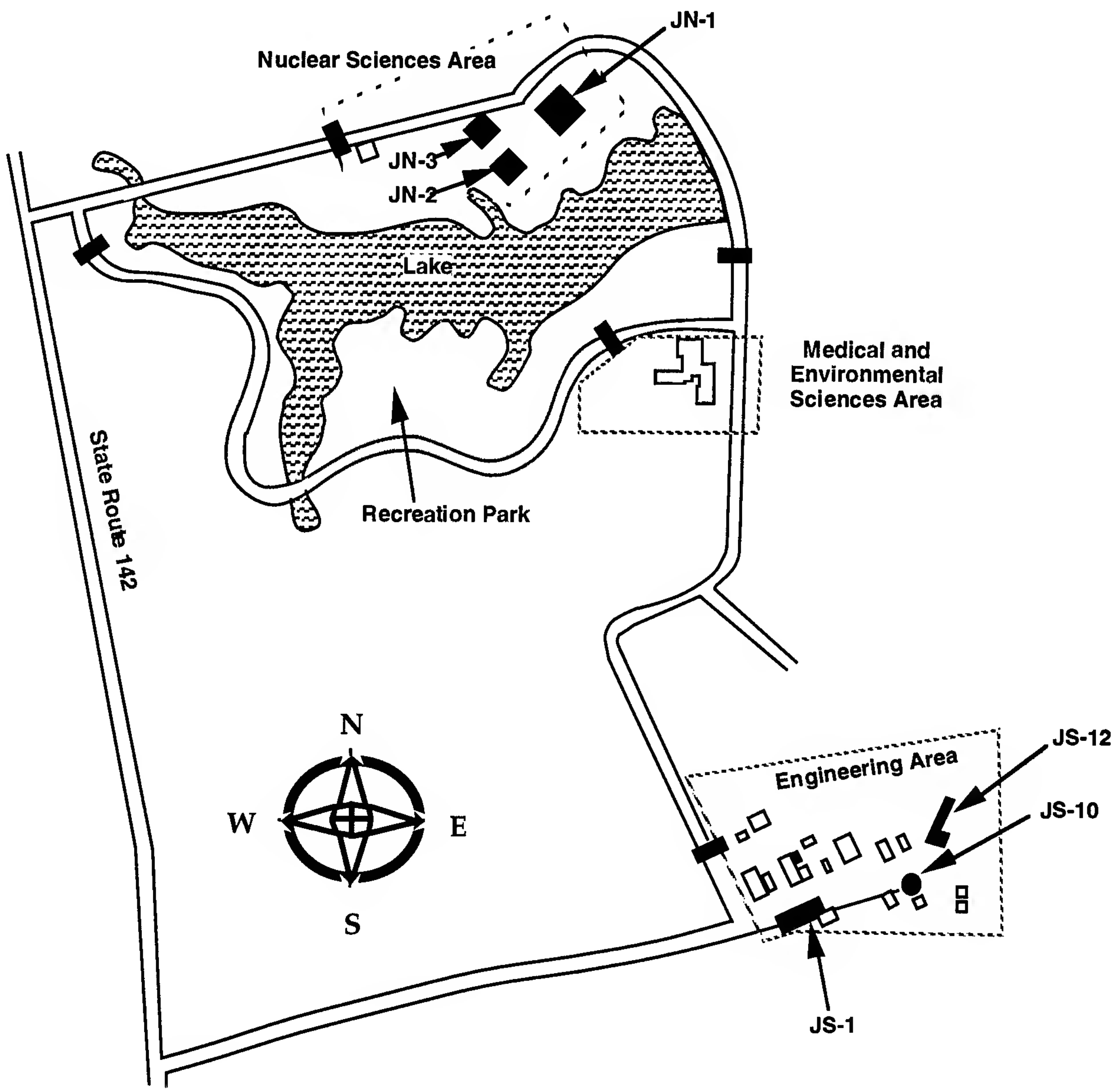
	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Battelle-Columbus Laboratories	0	0	0	0	0	0	0	136,770
Fernald Environmental Management	4,246	1,453	200	240	400	160	0	5,402,034
Mound Plant	0	0	0	0	0	0	0	2,142,490
Piqua Nuclear Power Facility	0	0	0	0	0	0	0	152
Portsmouth Gaseous Diffusion Plant	222,705	52,901	17,028	2,323	1,599	1,065	0	8,706,321
Reactive Metals, Co., Extrusion Plant	0	0	0	0	0	0	0	166,053
Ohio – FUSRAP	0	0	0	0	0	0	0	269,194
Total - Ohio	226,951	54,354	17,228	2,563	1,999	1,225	0	16,823,014

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

BATTELLE COLUMBUS LABORATORIES

Battelle Columbus Laboratories is located in Columbus, Ohio. It includes two separate plants: one in downtown Columbus at King Avenue (nine buildings) and the other, the West Jefferson site (six buildings) in more rural surroundings. Department of Energy (DOE) activities are managed by DOE's Chicago Operations Office.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	16,082	17,705	18,970	19,880	19,895	17,662
Program Management	3,073	3,400	3,135	3,422	2,602	1,623
Total	19,155	21,105	22,105	23,302	22,497	19,285

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	17,273	2,992	0	0	0	0	0	118,598
Program Management	2,695	400	0	0	0	0	0	18,172
Total	19,968	3,392	0	0	0	0	0	136,770

** *Costs reflect e five-yeer everage in constent 1995 dollars, except in FY 1995 - 2000, which is e six-year everage.*

*** *Total Life Cycle is the sum of ennuel costs in constant 1995 dollars.*

PAST, PRESENT AND FUTURE MISSIONS

Battelle Columbus Laboratories performed atomic research and development for the Department of Energy (DOE) and its predecessor agencies between 1943 and 1986. Nuclear research included fabrication of uranium and fuel elements; reactor development; submarine propulsion; fuel reprocessing; and safety studies of reactor vessels and piping.

Battelle Columbus Laboratories is currently undergoing decommissioning under the Environmental Management program and as a condition of its Nuclear Regulatory Commission license. Once decommissioning has been completed to "free release" criteria identified in DOE Order 5400.5, the Battelle Columbus Laboratories facilities will be returned to Battelle Memorial Institute without radiological restrictions.

It is assumed all 15 Battelle Columbus Laboratories facilities will be returned to Battelle Memorial Institute after decommissioning. Since Battelle Columbus Laboratories facilities are privately owned, all decisions regarding future use rest with Battelle. The Battelle Columbus Laboratories Decommissioning Project is a cost-share project between the DOE (90 percent share) and Battelle Memorial Institute (10 percent share).

ENVIRONMENTAL RESTORATION

The type and extent of contamination varies from building to building, depending on the nature of nuclear research historically performed. Most of the contamination in laboratory and metal fabricating areas at the downtown King Avenue site is due to uranium, thorium, and associated daughter products. The more rural West Jefferson site, location of a large hot cell facility and a decommissioned research reactor, has also been contaminated by transuranics, mixed fission products, and activation products. All buildings containing radioactive materials have been evaluated through a project hazard assessment and have been shown to be of low risk to workers and the public.

The principal contaminated media at both Battelle Columbus Laboratories sites are facilities and equipment. Small areas of surface soils may also be contaminated. Ground-water contamination is not anticipated at either site.

Environmental restoration work at Battelle Columbus Laboratories includes pre-decommissioning and surveillance and maintenance, task coordination and management, assessment, characterization, relocation of equipment and furnishings, decontamination of equipment and facilities, decontamination and/or remediation of contaminated soils surrounding facilities, and post-decontamination inspections, surveys, compilation of certification documents, and preparation of release documents. Once the decommissioning effort has been completed, plans will be developed and implemented to restore the buildings and sites to usable conditions. At the assumed funding levels, Battelle Columbus Laboratories' decommissioning effort is expected to be completed by FY 2005.

WASTE MANAGEMENT

Waste Treatment, Storage and Disposal

Waste generated by decommissioning activities include low-level radioactive waste, low-level mixed waste, transuranic waste, and hazardous waste. Low-level waste and low-level mixed waste are shipped offsite to approved DOE disposal facilities; transuranic waste is currently being stored onsite pending opening of an approved transuranic waste disposal site such as the Waste Isolation Pilot Plant; and hazardous wastes are shipped to approved commercial treatment and disposal facilities. Battelle Columbus Laboratories has no plans to construct long-term treatment, storage, or disposal facilities at its locations. Battelle operates a Resource Conservation Recovery Act (RCRA) Part A hazardous waste management facility with minimal storage capacity. Waste management costs are included within the scope of environmental restoration activities.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	17,273	2,992	0	0	0	0	0	118,598

* Costs reflect e five-yeer everege in constent 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constent 1995 dollars.

Battelle Columbus Laboratories does not treat waste onsite. All waste are shipped to appropriate facilities for treatment, as necessary, prior to disposal.

Hazardous and radioactive waste generated by decontamination operations are collected, reduced in volume and packaged, classified, and stored temporarily pending offsite shipment. Transuranic waste are currently stored onsite pending the opening of the Waste Isolation Pilot Plant in New Mexico.

Low-level waste and low-level mixed waste are shipped to DOE's Hanford, Washington facility and to Envirocare; hazardous waste is sent to commercial treatment facilities. Waste operations are funded and managed within the scope of environmental restoration, and will be complete in 2005.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at Battelle Columbus Laboroatories.

LANDLORD FUNCTIONS

Under the current contract with DOE, landlord costs for Battelle Columbus Laboratories are the responsibility of Battelle Memorial Institute.

PROGRAM MANAGEMENT

Program management at Battelle Columbus Laboratories is concerned with decontamination planning, project control, and decommissioning management. Battelle Columbus Laboratories does not fund any grants or Agreements-In-Principle at this time.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Battelle Columbus Laboratories.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	2,695	400	0	0	0	0	0	18,172

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	1,727	299	0	0	0	0	0	11,860
Program Management	270	40	0	0	0	0	0	1,817
Total	1,997	339	0	0	0	0	0	13,677

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of ennual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	15,546	2,693	0	0	0	0	0	106,739
Program Management	2,426	360	0	0	0	0	0	16,355
Total	17,972	3,053	0	0	0	0	0	123,094

* Costs reflect e five-year everege in constant 1995 dollars, except In FY 1995-2000, which is e six-year everege.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

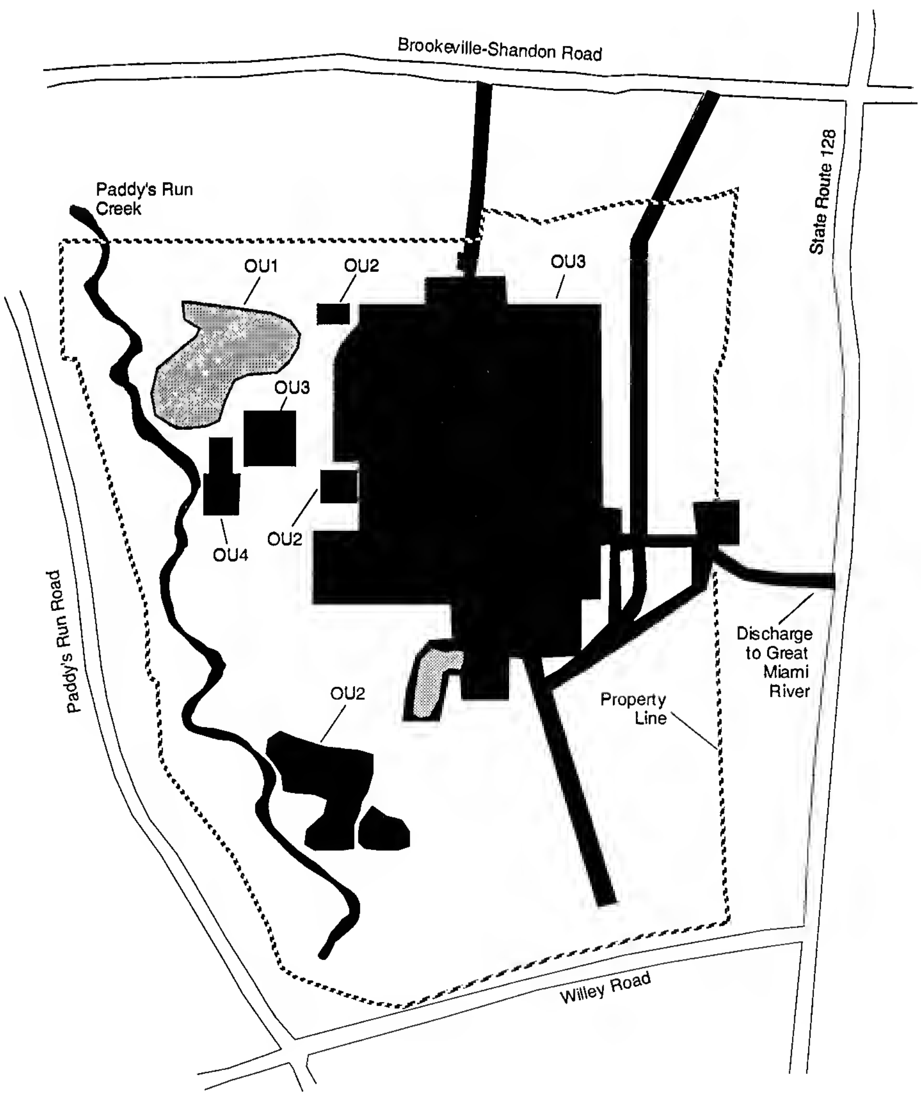
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Complete King Avenue Decommissioning	1997
	Complete West Jefferson Decommissioning	2000
	Environmental Restoration Activities completed	2005

For further information on this site, please contact: *Public Participation Office* *(708) 252-8796*
Public Affairs Office *(708) 252-2010*
Technical Liaison: Michael Ferrigan *(708) 252-2570*

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

The former Fernald Feed Materials Production Center is located on a 1,050-acre tract that overlaps the boundary between Hamilton and Butler Counties near the southwest corner of Ohio. It is approximately 20 miles northwest of Cincinnati. The Great Miami River flows nearby in a southerly direction, approximately one mile east of the site. Paddy's Run, a small stream, runs southward along the western boundary of the site. The Great Miami Aquifer flows beneath the Fernald site. The former production facilities and supporting infrastructure comprise approximately 136 acres of the 1,050-acre site.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	159,000	177,700	187,400	210,400	195,700	327,600
Directly Appropriated Landlord	63,100	52,300	49,000	49,000	49,300	70,000
Program Management	86,500	77,100	65,400	66,200	65,200	76,100
Total	308,600	307,100	301,800	325,600	310,200	473,700

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	184,184	244,800	69,078	33,588	12,868	12,630	8,862
Directly Appropriated Landlord	51,515	57,840	45,560	24,680	3,360	2,088	2,506
Program Management	67,859	90,308	55,276	30,504	7,358	4,888	3,244
Total	303,558	392,948	169,914	88,772	23,586	19,606	14,612

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	70	200	200	240	400	160	0	3,020,548
Directly Appropriated Landlord	4,176	1,253	0	0	0	0	0	1,016,403
Program Management	0	0	0	0	0	0	0	1,365,046
Total	4,246	1,453	200	240	400	160	0	5,402,034

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The Fernald Feed Materials Production Center, later renamed the Fernald Environmental Management Project, was constructed in the early 1950's to convert uranium ore into uranium metal, and then to fabricate the uranium metal into target elements for reactors that produced weapons-grade plutonium and tritium. Production operations spanned more than 36 years until they were suspended on July 10, 1989. Following necessary notifications, the facility was formally shut down on June 19, 1991. During the facility's production mission, over 500 million pounds of high-purity uranium products were yielded to support U.S. defense initiatives.

In 1986, the U.S. Environmental Protection Agency (EPA) and the Department of Energy (DOE) entered into a Federal Facility Compliance Agreement covering environmental impacts associated with site activities. The Fernald site was placed on EPA's National Priorities List in 1989. A Consent Agreement was signed by DOE and EPA in

1990 and amended in 1991. This agreement established five operable units, as follows:

- Operable Unit 1 - Waste Pit Area
- Operable Unit 2 - Other Waste Areas
- Operable Unit 3 - Former Production Area
- Operable Unit 4 - Silos 1 through 4
- Operable Unit 5 - Environmental Media

The Ohio EPA is an active participant in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process and is the lead agency overseeing the treatment, storage, and disposal of hazardous waste.

In addition to the five operable units, there is remnant production waste, referred to as legacy waste, which is stored in containers at the Fernald site. This waste has been designated for permanent disposal.

Fernald's current mission is environmental restoration, consistent with the remedies defined in a final record of decision for each operable unit and in an approved Treatment, Storage, and Disposal Plan.

The future use of all areas at Fernald is currently under consideration by the Fernald Citizens' Task Force. A preliminary recommendation is that there should be no new agricultural or residential uses on the Fernald property following its remediation. Evaluations are continuing regarding the potential for establishing recreational, commercial/industrial, or undeveloped open space (i.e., green space) on the portions of Fernald property outside the area of an engineered, onsite disposal facility. Formal recommendations on waste disposition and land use will be presented in a final report from the Task Force scheduled for release in July 1995.

All areas of Fernald, with the exception of an engineered, onsite disposal facility, are assumed to attain cleanup levels which provide for: (1) the protection of persons engaged in on-property industrial and/or recreational uses, and (2) the protection of an offsite farmer. The remedies would provide a maximum estimated risk to a future industrial or recreational user of the Fernald property within an acceptable range of 10^{-5} to 10^{-6}. The engineered, onsite disposal facility will be established as a continuing, restricted access area. The Great Miami Aquifer is scheduled to be remediated and returned to its full beneficial use by FY 2028.

The projected life-cycle costs for the Fernald Environmental Management project are provided in the following table.

ENVIRONMENTAL RESTORATION

During production, many uranium-bearing materials were used in the manufacturing process. These materials included uranium concentrates, recyclable enriched residues, uranium hexafluoride, and a variety of recycled uranium metals (both depleted and enriched) from various facilities. In the production processes, Fernald produced large quantities of solid and liquid low-level radioactive waste. Air was the predominant pathway by which the facility released radioactive particles, but Fernald also routinely released radionuclides into the soil and water, as well. In addition to the former production facilities, the major sources of contamination include:

- six low-level waste storage pits;
- a burnpit;
- a clearwell;
- two concrete silos containing radium-bearing residues;
- one concrete silo containing metal oxides;
- the South Field area, which was a depository of soil and construction debris with low levels of radioactivity; and
- two flyash disposal areas.

Two lime sludge ponds and a solid waste landfill are additional sources of contamination.

Several primary release mechanisms – including air, wastewater discharge, spills, leaks, and land disposal – provided the vehicles for transport of contaminants to environmental media and, subsequently, to potential human and ecological receptors. Secondary releases, such as, resuspension in air of contaminated soil through wind action, contributed to further contaminant migration and transport to other media.

Water releases to the environment occurred through leaking wastewater lines, discharges into the Great Miami River and Paddy's Run, and stormwater runoff. Surface water runoff is a significant pathway for the migration of contaminants in environmental media. There have been offsite environmental impacts to the Great Miami Aquifer and to surface soils adjacent to the site.

Risks to human and ecological receptors have been evaluated for the site as it presently exists and for simulated conditions up to 1,000 years in the future. The results demonstrate that existing concentrations of radiological and chemical contamination in both the source material and the environmental media pose risks to human and ecological receptors at levels sufficient to trigger the need for remedial actions.

Potential noncarcinogenic health effects for a waste site are assessed in terms of an EPA hazard index for each contaminant of concern. A threshold hazard index value of 1.0 (unitless)

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Fernald Treatment/Storage/Disposal	8,659	3,660	3,660	2,722	2,094	2,094	1,256
Operable Unit 1	49,930	48,322	60	66	60	66	66
Operable Unit 2	27,969	43,838	900	720	0	0	0
Operable Unit 3	51,699	112,598	29,650	0	0	0	0
Operable Unit 4	21,038	1,508	0	0	0	0	0
Operable Unit 5	24,889	34,874	34,808	30,080	10,714	10,470	7,540
Total	184,184	244,800	69,078	33,588	12,868	12,630	8,862

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Fernald Treatment/Storage/Disposal	0	0	0	0	0	0	0	129,382
Operable Unit 1	30	0	0	0	0	0	0	542,931
Operable Unit 2	0	0	0	0	0	0	0	395,106
Operable Unit 3	D	0	0	0	0	0	0	1,021,434
Operable Unit 4	0	0	0	0	0	0	0	133,771
Operable Unit 5	40	200	200	240	400	160	0	797,961
Total	70	200	200	240	400	160	0	3,020,548

* *Costs reflect a five-yeer average in constent 1995 dollars, except in FY 1995-2000, which is a six-yeer average.*

** *Total Life Cycle is the sum of ennuel costs in constant 1995 dollars.*

has been established as the level above which there is the potential for noncarcinogenic effects on exposed individuals. For current land use with access controls, the hazard index ranges from 1.8 to 260, depending on the receptor. For future land use – without any removal of contaminated sources, and with somewhat less restrictive controls than the site access controls now employed – the hazard index would range from 37 to 260.

Carcinogenic risk is the potential for a contaminant to induce human cancer and is expressed as an incremental lifetime cancer risk. Contaminants present in sufficient concentrations to create an excess lifetime cancer risk within or less than the range of 1 chance in 10,000 to 1 chance in 1,000,000 are considered acceptable to the EPA. For current land use with access controls, the incremental life cancer risk ranges from 1 in 100,000 for a site worker to 1 in 100 for an offsite farmer. For future land use – without any removal of contaminated sources, and with somewhat less restrictive controls than the site access controls now employed – the incremental lifetime cancer risk would range from 1 in 14,000 to 1 in 5.

These elevated risk factors, both carcinogenic and noncarcinogenic, support the need for environmental restoration efforts at Fernald.

Operable Units

A brief description and status of each operable unit and the low-level legacy waste restoration activities are given below:

Operable Unit 1

The Operable Unit 1 area consists of six waste pits, a burn pit, and a clearwell. All waste material would be excavated, treated by drying to meet waste acceptance criteria, then shipped to a commercial disposal facility. Contaminated surface soils and soils beneath the waste areas would be forwarded to Operable Unit 5 for final disposition. Residual water, which includes surface water, perched ground water incidental to waste unit remediation, and residual process water, will be treated at Fernald's Advanced Wastewater Treatment Facility. All impacted Operable Unit 1 material is being processed as a low-level waste.

Both the Remedial Investigation and the Feasibility Study/Proposed Plan/ Environmental Assessment were approved by the EPA, and the Operable Unit 1 Record of Decision was approved by the EPA on March 1, 1995. Remedial design work is underway. A field demonstration program has been initiated to evaluate dewatering and waste excavation techniques further. Remedial action activities are scheduled to commence during June 1996.

Operable Unit 2

Operable Unit 2 consists of five waste units and their associated berms, liners, and soils. Specifically, the waste units include the Solid Waste Landfill, the Lime Sludge Ponds, the Inactive Flyash Pile, the South Field Depository, and the Active Flyash Pile. Construction and operation of an engineered, onsite disposal facility is also an Operable Unit 2 function. All material in Operable Unit 2 waste units which exceeds the required cleanup levels will be excavated, processed for size reduction and moisture control, and disposed of in the onsite disposal facility. An exception will be an expected small fraction of excavated material that will exceed the onsite disposal facility waste acceptance criteria. This latter material will be shipped to a commercial disposal facility. Surface water and perched ground water incidental to waste unit remediation will be treated at Fernald's Advanced Waste Water Treatment Facility. All impacted Operable Unit 2 material is classified as low-level waste.

The Operable Unit 2 Remedial Investigation is approved by the EPA, and the Feasibility Study/Proposed Plan/Environmental Assessment is conditionally approved by the EPA. Additionally, the draft record of decision

is under review by the EPA. A predesign investigation has been initiated to determine the area with the most suitable geology for an engineered, onsite disposal facility. Remedial action activities are scheduled to commence during August 1996. Under current plans, Operable Unit 2 will be assigned the long-term surveillance and monitoring responsibility for any onsite disposal facility following completion of assigned remedial actions.

Active Operable Unit 2 environmental restoration activities that are being conducted as CERCLA Removal Actions include the South Field Surface Seep Control Project and continued maintenance of the Active Flyash Pile and the Paddy's Run Erosion Control Structure.

Operable Unit 3

Operable Unit 3 consists of all artificial aboveground and belowground structures at Fernald that are not included in the other operable units. This includes existing storage pads, roads, the wastewater treatment system, the sewer and electrical systems, railroads, fences, inventory, drums, and material piles. Most of these are located within the 136-acre former production area at the Fernald site.

There are 128 buildings designated for decommissioning and dismantling. Each structure is initially processed by the Fernald safe shutdown project to remove residual process wastes, and then gross contamination is removed from above-grade surfaces. Once gross decontamination is complete, all asbestos, electrical lines, and heating, ventilating, and air conditioning ductwork are removed. The structural components are then dismantled, followed by the structure's foundations and associated below-grade facilities. Most Operable Unit 3 materials are currently classified as low-level waste.

For Operable Unit 3, DOE estimates that 36 percent of low-level radioactive waste material will be shipped to the Nevada Test Site for burial, 2 percent of waste will be recycled, and the remaining 62 percent will be placed in an onsite disposal facility. Existing facilities will be used for interim storage until the onsite disposal facility is ready to receive waste material. Evaluations are in progress to determine the feasibility of recycling structural and low-grade steels and disposing of concrete and asbestos siding in the onsite disposal facility. Contaminated soils will be excavated and dispositioned by Operable Unit 5. Any surface water and perched ground water that are generated incidental to facility remediation will be treated at the Fernald Advanced Waste Water Treatment Facility.

An Operable Unit 3 Interim record of decision has been approved by the EPA for the decommissioning and dismantling of plant area buildings. Most of the buildings in the former Fernald process area will be decommissioned and dismantled as an interim remedial action. Treatment and final disposition of the dismantled material will be defined in the final record of decision. The Remedial Investigation and Feasibility Study/Proposed Plan to support the final record of decision are in the development stage.

Active Operable Unit 3 environmental restoration activities being conducted as CERCLA removal actions include: safe shutdown; asbestos abatement; decommissioning and dismantling of the Plant 1 Ore Silos and Plant 7; the Plant 1 Storage Pad Upgrade project; and the removal and temporary storage of contaminated media at the former Fire Training Facility.

Operable Unit 4

The K-65 residues and cold metal oxides will be removed from Silos 1, 2, and 3 and treated in an onsite vitrification facility. The sludges from the decant sump tank will also be removed and

vitrified. Following treatment, the vitrified residues will be containerized and transported offsite for disposal at the Nevada Test Site. Silo 4 is empty except for some infiltration water.

Following removal of residues, the concrete silo structures and associated facilities will be demolished. Construction debris will be processed for size reduction and permanently stored in the Fernald onsite disposal facility. Contaminated soils immediately adjacent and under the silos would be forwarded to Operable Unit 5 for final disposition. Residual water, which includes surface water, perched ground water, and residual process water, will be treated at the Fernald Advanced Waste Water Treatment Facility.

All residue material in the silos and decant sump tank are classified as "by-product material" as defined in section 11, paragraph e(2), of the Atomic Energy Act of 1954, as amended. All contaminated soils, concrete debris, and ground water will be processed as low-level waste.

Both the Operable Unit 4 Remedial Investigation and the Operable Unit 4 Feasibility Study/Proposed Plan/ Environmental Impact Statement are approved by the EPA. The final record of decision was signed by the EPA on December 7, 1994. As part of the remedial design phase, a pilot plant is being constructed to evaluate further the vitrification process. Construction of the pilot vitrification plant commenced during FY 1994. Remedial action activities were scheduled to commence during March 1995.

Operable Unit 5

Operable Unit 5 consists of contamined soils (except those associated with Operable Unit 2), on-property and off-property ground water, surface water, flora, and fauna. Remedial activities involve excavation and transport to the onsite disposal facility soil that exceeds required cleanup levels; excavation of contaminated soil that exceeds the onsite waste acceptance criteria and its shipment to a commercial disposal facility; extraction and treatment of contaminated storm water runoff. Operable Unit 5 operations will fund the construction of the Advanced Waste Water Treatment Facility. Most waste is tentatively designated as low-level waste, with a small fraction potentially classified as low-level mixed waste.

Cleanup levels for site soils are being established in the Operable Unit 5 Feasibility Study for a wide range of land use objectives. Final cleanup levels will be established in the Operable Unit 5 Record of Decision, once land use recommendations are formalized by the Fernald Citizens' Task Force.

The Remedial Investigation is conditionally approved by the EPA, and the Feasibility Study/Proposed Plan is undergoing review by the EPA. Remedial action activities are scheduled to commence during October 1996.

Active Operable Unit 5 environmental restoration activities that are being conducted as CERCLA Removal Actions include the removal and treatment of contaminated, perched ground water located beneath the former plant area; use of a surface water runoff control and treatment system for the Waste Pit Area; and use of an offsite ground-water migration control system to minimize migrations into the Great Miami Aquifer. The ground-water migration control system will extract ground water and treat surface waters prior to their subsequent discharge to the Great Miami River. Installation of additional advanced wastewater treatment capacity is integral to the removal actions.

Low-Level Legacy Waste

Fernald's legacy of low-level waste is in containerized storage. It consists largely of wastes generated as part of activities associated with former production operations and maintenance activities, utility operations, and

laboratory analyses. Approximately 80 percent of the 167,400 cubic yards of low-level waste material has been shipped to the Nevada Test Site as a CERCLA removal action. The remaining 20 percent is scheduled for disposal at the Nevada Test Site during FY 1995 and FY 1996.

That legacy waste which is classified as low-level mixed waste is being processed as a Federal Facility Compliance Act action. A draft treatment, storage, and disposal plan has been submitted to the Ohio EPA for review and approval. Low-level mixed waste associated with the hydrofluoric acid neutralization system, the uranyl nitrate hexahydrate treatment system, and the wastewater treatment system will be treated using existing, onsite facilities and will be shipped for final disposition at the Nevada Test Site. Waste designated for stabilization or chemical processing will be treated by a mobile vendor and disposed of at the Nevada Test Site. Selected low-level mixed waste was treated during FY 1993 and FY 1994 at the Toxic Substance Control Act incinerator at the DOE K-25 Site in Oak Ridge, Tennessee. The remaining waste is scheduled for final disposition from FY 1995 through FY 1997. Disposal of treated low-level mixed waste at existing commercial facilities is being explored.

WASTE MANAGEMENT

Treatment, Storage and Disposal Operations

Production operations at the former Fernald Feed Materials Production Center were suspended during FY 1989 and the facility was formally shut down during FY 1991. All current activities at Fernald are associated with environmental restoration. Fernald's waste management organizational costs are funded within the scope of environmetal restoration activities. Legacy low-level waste are being dispositioned as stated in the preceding section.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

A facility stabilization activity titled "safe shutdown" was initiated at Fernald to place existing equipment and structures in the former plant area in a safe, shutdown configuration. Safe shutdown activities include program planning and scheduling; engineering; isolation of process equipment, piping systems and associated utilities; the removal and packaging of residual process or excess materials; and the disposition of materials to an approved onsite, interim, storage location. All safe shutdown activities fall under the responsibility of Operable Unit 3 and are funded within the scope of environmental restoration.

LANDLORD FUNCTIONS

Landlord provides for common environmental, safety, and health functions not associated with restoration activities. Responsibilities include the operation and maintenance of the Fernald steam plant; compressed air system; potable water treatment system; process water treatment system; cooling water system; sanitary waste treatment system; site utilities; office buildings and warehouses; vehicle maintenance; and maintenance of former plant area buildings, roads, and parking facilities. Maintenance of the remedial action construction infrastructure, such as, construction office facilities, laydown areas, interim storage areas, roads, and parking, are also landlord functions. Landlord is also responsible for site custodial services, porter service, the site laundry, offsite facility leases and maintenance, inventory control, and site security.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration TSO	8,659	3,660	3,660	2,722	2,094	2,094	1,256
Operable Unit 1							
Assessment	3	0	0	0	0	0	0
Remedial Actions	49,927	48,310	0	0	0	0	0
Surveillance and Maintenance	0	12	60	66	60	66	66
Operable Unit 2							
Assessment	75	0	0	0	0	0	0
Remedial Actions	27,894	43,658	0	0	0	0	0
Surveillance and Maintenance	0	180	900	720	0	0	0
Operable Unit 3							
Assessment	3,163	0	5,930	0	0	0	0
Facility Decommissioning	48,536	112,598	23,720	0	0	0	0
Operable Unit 4							
Assessment	1,088	0	0	0	0	0	0
Remedial Actions	19,950	1,470	0	0	0	0	0
Surveillance and Maintenance	0	38	0	0	0	0	0
Operable Unit 5							
Assessment	285	0	0	0	0	0	0
Remedial Actions	24,603	34,874	34,808	30,080	10,714	10,470	7,540
Surveillance and Maintenance	0	0	0	0	0	0	0
Total	184,184	244,800	69,078	33,588	12,868	12,630	8,862

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration TSO	0	0	0	0	0	0	0	129,382
Operable Unit 1								
Assessment	0	0	0	0	0	0	0	19
Remedial Actions	0	0	0	0	0	0	0	541,112
Surveillance and Maintenance	30	0	0	0	0	0	0	1,800
Operable Unit 2								
Assessment	0	0	0	0	0	0	0	450
Remedial Actions	0	0	0	0	0	0	0	385,656
Surveillance And Maintenance	0	0	0	0	0	0	0	9,000
Operable Unit 3								
Assessment	0	0	0	0	0	0	0	48,628
Facility Decommissioning	0	0	0	0	0	0	0	972,806
Operable Unit 4								
Assessment	0	0	0	0	0	0	0	6,529
Remedial Actions	0	0	0	0	0	0	0	127,051
Surveillance and Maintenance	0	0	0	0	0	0	0	192
Operable Unit 5								
Assessment	0	0	0	0	0	0	0	1,713
Remedial Actions	0	0	0	0	0	0	0	790,049
Surveillance and Maintenance	40	200	200	240	400	160	0	6,200
Total	70	200	200	240	400	160	0	3,020,548

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PROGRAM MANAGEMENT

Fernald program management includes performing legal and public affairs functions to ensure conformance to applicable Federal and State laws and regulations, with due consideration of stakeholder concerns. Program management activities also include those associated with executive and technical management, business management required to implement the Project Management System per DOE Orders 4700.1 and 4700.5, management of contractual and related issues, quality assurance, regulatory and technology management, systems integration, DOE oversight, ongoing litigation, and regulatory oversight. Oversight of waste minimization activities is also a program management function, whereas actual implementation is part of the operating unit and legacy waste environmental activities.

Technology Development

Technology programs conducts vigorous technology development programs which have integrated several cost-saving improvements into Fernald activities in areas such as robotics and materials handling technology; cleanup and integrated demonstrations involving uranium in soils, including real-time monitoring and analysis; and decontamination by plant update. Technology programs also conducts advanced development work through special contracts with the Alliance of Ohio Universities and the Historically Black Colleges and Universities/Minority Institute Environmental Technology and Waste Management Consortium.

Landlord Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Oirectly Appropriated Landlord	51,515	57,840	45,560	24,680	3,360	2,088	2,506	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Directly Appropriated Landlord	4,176	1,253	0	0	0	0	0	1,016,403

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	67,859	90,308	55,276	30,504	7,358	4,888	3,244	1,365,046

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year everage.*

** *Total Life Cycle is the sum of ennual costs in constant 1995 dollars.*

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Fernald.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	184,184	244,800	69,078	33,588	12,868	12,630	8,862
Oirectly Appropriated Landlord	51,515	57,840	45,560	24,680	3,360	2,088	2,506
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	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	70	200	200	240	400	160	0	3,020,548
Oirectly Appropriated Landlord	4,176	1,253	0	0	0	0	0	1,016,403
Program Management	0	0	0	0	0	0	0	1,365,046
Total	4,246	1,453	200	240	400	160	0	5,402,034

* *Costs reflect a five-yaar averaga in constant 1995 dollars, excapt in FY 1995-2000, which is a six-year average.*

** *Total Lifa Cycle is the sum of annual costs in constant 1995 dollars.*

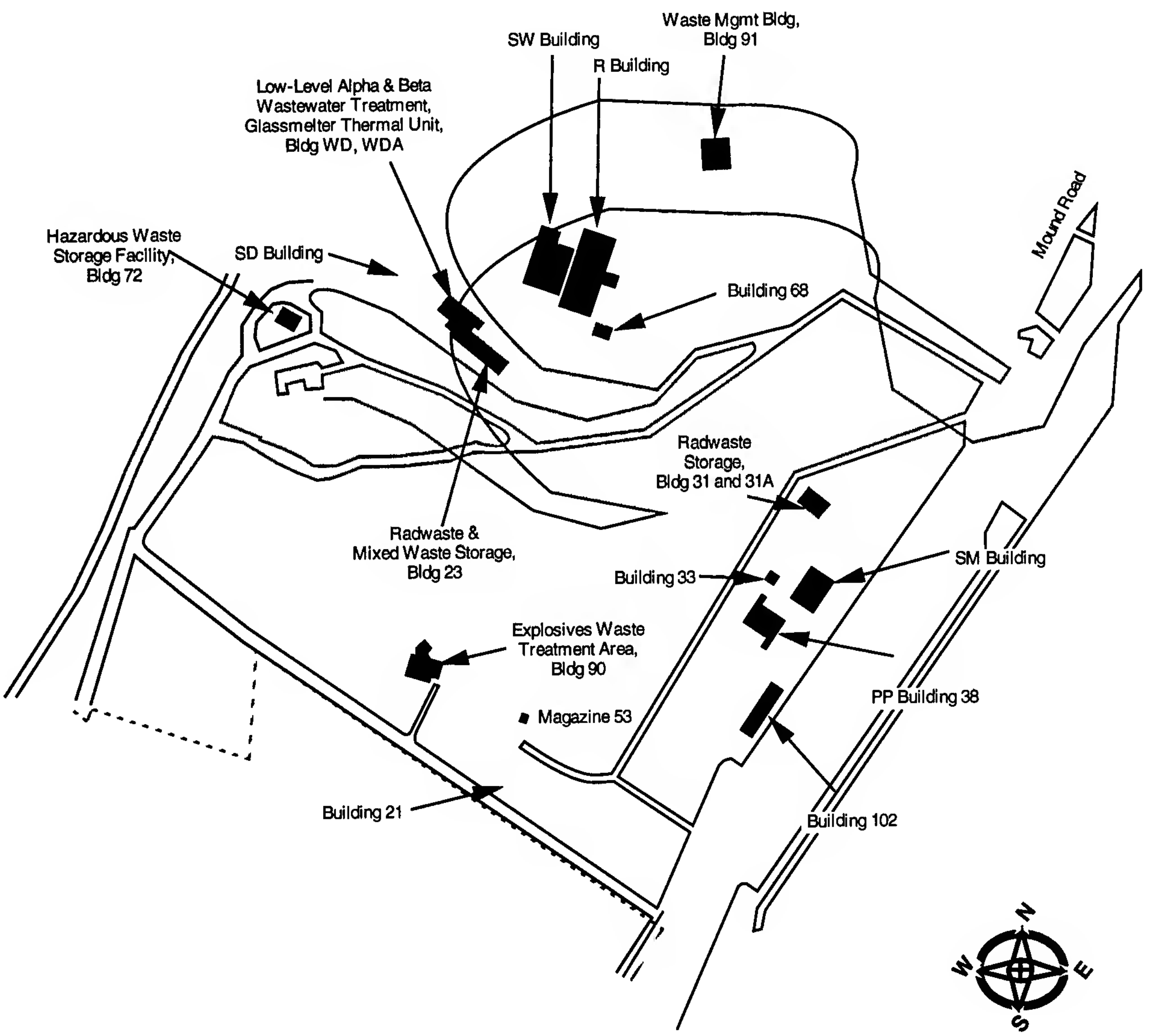
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE Fiscal Year
Operable Unit 1 - Waste Pit Area	Final Record of Decision Signed by EPA	1995
	Remedial Action Starts	1996
	Remedial Action Ends	2004
Operable Unit 2 - Other Waste Areas	Final Record of Decision Signed by EPA	1995
	Remedial Action Starts	1996
	Remedial Action Ends: Waste Areas	2001
	Remedial Action Ends: Onsite Disposal Facility	2014
Operable Unit 3 - Former Production Area	Interim Remedial Action Starts	1995
	Final Remedial Investigation Report Submitted to EPA	1996
	Final Feasibility Study Report Submitted to EPA	1996
	Final Record of Decision Signed by EPA	1996
	Final Remedial Action Ends	2010
Operable Unit 4 - Silos 1 through 4	Vitrification Pilot Plant Project Started	1994
	Final Record of Decision Signed by EPA	1994
	Remedial Action Starts	1995
	Remedial Action Ends	2003
Operable Unit 5 - Environmental Media	Final Record of Decision Signed by EPA	1996
	Remedial Action Starts	1997
	Remedial Action Ends: Soils	2014
	Remedial Action Ends: Ground Water	2028
Legacy Waste	Site Treatment Plan Submitted to Ohio EPA	1995
	Removal Action Ends: Low-Level Waste	1996
	Removal Action Ends: Low-Level Mixed Waste	1997

For further information on this site, please contact: *Public Participation Office* *(513) 865-3968*
Public Affairs Office *(513) 865-3968*
Technical Liaison: Dave Lojek *(513) 648-3127*

MOUND PLANT

The Mound Plant is located within the southern city limits of Miamisburg in southwestern Ohio. The site occupies 306 acres of land overlooking Miamisburg and the Great Miami River. The Dayton metropolitan area is 10 miles northeast of the plant.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	25,745	46,694	54,807	54,805	53,682	64,607
Waste Management	11,477	9,236	8,389	8,549	9,485	7,464
Nuclear Material and Facility Stabilization	0	17,100	17,600	18,100	18,700	19,200
Directly Appropriated Landlord	0	29,300	36,600	37,800	38,900	40,100
Program Management	8,016	11,648	13,060	13,098	13,107	14,787
Total	45,238	113,978	130,456	132,352	133,874	146,158

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 raflact EM budget submission, costs for FY 1997-2000 reflect Budgat Shortfall Scenario, costs for shadad araa assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	46,053	16,747	20,149	11,119	4,022	935	0	541,183
Waste Management	8,507	6,113	6,356	6,184	5,120	271	23	171,374
Nuclear Material and Facility Stabilization	27,598	17,816	32,780	1,104	0	0	0	424,086
Directly Appropriated Landlord	27,202	34,800	34,800	34,800	20,000	4,000	0	805,211
Program Management	8,314	10,585	10,453	6,638	2,200	268	6	200,635
Total	117,674	86,061	104,538	59,845	31,342	5,474	29	2,142,490

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-yaar avaraga.

*** Total Life Cycla is tha sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Since 1947, Mound has been an integrated research, development, and production facility for defense and nondefense programs conducted by the Department of Energy (DOE) and its predecessors. Mound's past missions for defense programs included the fabrication of components for nuclear weapons as well as development and testing of both nuclear and nonnuclear components. Additional manufacturing roles at Mound included the production of stable isotopes for medical, industrial, and general research; the production of small chemical heat sources; the recovery and purification of tritium; the fabrication of radioisotope (plutonium-238) electrical power sources for spacecraft; and surveillance of explosive and radioactive weapons components.

The Department has stopped defense operations at the Mound Plant and plans to transfer them to other sites. The primary mission of the Mound Plant is now environmental management. Activities include environmental restoration, decommissioning, and waste management. These programs should continue through approximately FY 2022. The City of Miamisburg envisions the site as a commercial mall or an industrial park.

Economic development at the Mound site will be a closely coordinated effort between the general public, the Ohio Environmental Protection Agency, the Ohio Health Department, the City of Miamisburg, and DOE. Environmental Management (EM) assumed full landlord responsibility for the Mound Plant on October 1, 1994.

ENVIRONMENTAL RESTORATION

Approximately 125 confirmed and potential release sites have been documented at the Mound Plant. Because its past operations were so diverse, the plant used a variety of radioactive materials and chemicals. The main radioactive contaminants of concern are plutonium and tritium. The chemical contaminants of concern include various volatile organic compounds in the form of solvents, paints, and industrial cleaning agents.

There have been only two offsite accidental releases of radioactive material. The first occurred in 1969, when liquid waste containing plutonium leaked into soil at the site and migrated offsite after a pipeline ruptured. Heavy rain moved this soil into the bed of the Miami-Erie canal, where it adhered to subsurface clay. The second release occurred in 1989, when a small quantity of tritium gas escaped through a plant stack after an accident in a laboratory. Continuous testing, including a 1990 study by the National Institutes of Health, has found no adverse health effects to residents of Montgomery County attributable to the Mound Plant.

Currently, the Mound program is conducting a remedial investigation of the site and plans to complete remedial actions in FY 2015. The Environmental Protection Agency (EPA) oversees the environmental restoration activities at Mound.

Operable Units

The areas involved have been divided into operable units. Originally, nine operable units had been defined, but three of the units have been found to require no further action. The environmental restoration project is negotiating with applicable regulators to define the cleanup levels for each operable unit. Future use designations will likely reflect a commercial/ industrial scenario. The six remaining operable units are discussed below.

Operable Unit 1: Area B

Operable Unit 1 addresses an old landfill, the site's sanitary landfill, and an overflow pond that have been contaminated with volatile organic compounds. Part of this area was formerly used for open burning and waste disposal. The main concern is that contaminants released by these practices may be migrating into the Buried Valley Aquifer that underlies the southwest corner of the original Mound Plant.

The investigative phase for Operable Unit 1 was completed in June 1993. This unit is the first operable unit at Mound to transition from assessment to remediation. Remedial actions are scheduled to be completed in FY 1997-1998. In estimating cost for environmental restoration at this unit, it was assumed that in situ bioremediation technologies will be used.

Operable Unit 2: Main Hill

Operable Unit 2 addresses the source and pathways of possible contaminants at Mound's Main Hill. Offsite ground water seeps at Mound's North Hillside area are also addressed. Tritium releases that are known to have occurred in the past have been tracked since the 1970's; the extent of volatile organic compound contamination remains uncertain.

Investigative field work will be complete in FY 1998; the remedial action is scheduled to start in FY 2001 and to be complete in FY 2003. The

estimate for environmental restoration of this unit assumes that in situ bioremediation technologies would be used for treating any contaminated soils.

Operable Unit 4: Miami-Erie Canal

Operable Unit 4 addresses contamination in the old Miami-Erie Canal bed in Miamisburg. It covers the canal, the north and south pond within the park, the overflow creek from the canal to the Great Miami River, and the drainage ditch from Mound's west property line to the canal. Of concern is plutonium contamination introduced into the canal from past plant operations and non-routine equipment malfunctions. Both the plutonium and tritium have been monitored since the 1970's and have been found to present no imminent danger to human health or the environment. Initial characterization of the canal was completed in February 1993.

Remediation will consist of excavating and removing contaminated soils from the canal bed. The initial removal action will be conducted in FY 1995-2002. The canal bed will continue to be monitored for the presence of contamination and additional remedial actions will be carried out if necessary. Remediation is anticipated to be complete in FY 2008.

Operable Unit 5: South Property

This operable unit addresses onsite soil areas in the southern portions of the Mound Plant and specific areas suspected of containing radioactive materials. It covers areas known as the Special Metallurgical/Plutonium Processing Hill, the Buried Valley, and the New Property. Although available data indicates that most of Operable Unit 5 is not contaminated, there are small "pockets" of plutonium and thorium soil contamination.

Because there is a potential commercial future use designation for the new property portion of Operable Unit 5, remedial investigation field work for this section was accelerated to be completed in FY 1995. In addition, interim response actions will be completed in FY 1995 for three other areas: the fire fighting training area, the radionuclide-contaminated septic tank in area 7, and fuel and oil contaminated soil around the powerhouse. In FY 2001-2003, remedial investigation field work will resume for the remainder of Operable Unit 5. The expected remedial action for this unit is removal of the contaminated septic tank and in situ bioremediation of contaminated soils. All cleanup for this unit will be completed in FY 2006-2015.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	46,053	16,747	20,149	9,996	0	0	0	510,784
Facility Decommissioning	0	0	0	1,122	4,022	935	0	30,399
Total	46,053	16,747	20,149	11,119	4,022	935	0	541,183

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Operable Unit 6: Decommissioning Sites

Operable Unit 6 verifies the results of decommissioning at Mound. Eighty-eight buildings at the Mound site have been designated for safe shutdown or transition. After decommissioning, every site will be evaluated to ensure that regulatory cleanup standards are met. For the purposes of this report it was assumed that the standards for cleaning up soil areas will be consistent with an industrial future use designation.

The remediation work is scheduled to be completed by FY 2009, but the shipment and disposal of contaminated material will continue through FY 2010.

Operable Unit 9: Site-wide and Offsite Activities

Operable Unit 9 addresses the total environmental effects of any contamination attributable to Mound that may be found in the air, ground water, soils, surface water, and sediments as well as plant and animal life. It covers the entire plant and the area within 20 miles of the plant. Of concern are the cumulative onsite and offsite impacts of all other operable units. The schedule for activities in this unit is therefore at least partly dependent on the work performed at the other operable units. Investigative field work is to be completed in FY 2005, and the remediation decision is scheduled for FY 2007 and FY 2008. It is expected that the decision will be to recommend no further action. However, air monitoring will be initiated in FY 2008.

WASTE MANAGEMENT

The principal waste types at the Mound Plant are low-level radioactive waste, hazardous chemical waste from laboratories, and small amounts of low-level mixed waste and transuranic waste. The low-level radioactive waste consists of contaminated soils from decommissioning and sludge resulting from the processing of wastewater contaminated with alpha- and beta-emitting radionuclides. All waste generated in the future will be waste generated during environmental restoration.

Waste Treatment

The Mound Plant treats two of its waste streams: wastewater contaminated with alpha- and beta-emitting radionuclides and reactive hazardous waste. The wastewater is converted to a low-level sludge that can be solidified for disposal. Reactive hazardous waste is burned to render it nonreactive.

The Mound Plant is developing two technologies for the treatment of low-level mixed waste: a packed-bed reactor with silent discharge plasma and a technology for the capture of tritium. Both of these technologies are being developed as mobile treatment units. Mound is also planning to use an existing glass melter for treating some of the plant's mixed waste. The treatment of mixed waste will start in FY 1996 and will be completed in FY 2001.

In addition, Mound plans to evaluate biodegradation as a treatment for the mixed waste known as "scintillation cocktails."

Waste Storage

The Mound Plant's inventory of waste is stored in four areas. Low-level waste is temporarily stored in trailers. Transuranic waste is stored in Building 31. Low-level mixed waste is stored in Building 23, and hazardous waste is stored in Building 72. The storage buildings are in compliance with applicable regulations.

Waste Disposal

Transuranic waste will be shipped to the Waste Isolation Pilot Plant for disposal. All hazardous waste will be disposed of by a commercial

contractor. All low-level waste and treated low-level mixed waste will be disposed of at the Nevada Test Site or another acceptable government or commercial facility. Shipments of low-level waste are expected to continue through FY 2016.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The nuclear material and facility stabilization process began at the Mound Plant in 1995 (a description of this process, including breakdown of cost model categories and the national scheduling scenario, is provided in Volume I, Section 3). Of the 99 Mound facilities slated to undergo this process, 97 have already begun stabilization. Some of these facilities include storage tanks, ceramic development and production facilities, detonator manufacturing and storage facilities. It is assumed for purposes of this report that the two remaining facilities, a small area warehouse and garage will begin stabilization process in 1996. The resulting waste types include hazardous, transuranic, low-level, and low-level mixed. This report assumes that the stabilization and maintenance process at the Mound Plant will be completed by the year 2016.

LANDLORD FUNCTIONS

Landlord activities encompass many different functional areas and cost items. They include support for the environmental, safety and health program; site planning and project

Landlord Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Directly Appropriated Landlord	27,202	34,800	34,800	34,800	20,000	4,000	0	805,211

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	27,598	17,816	32,780	1,104	0	0	0	424,086

* *Cost shown include program management costs with each project.*

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

management; utilities; management and administration, such as human resources, procurement, taxes, logistics support, and fees. Support within these categories is the minimum amount of activity necessary to provide a caretaker function for the Mound Plant while maintaining compliance with existing Federal, State, and local laws and regulations.

PROGRAM MANAGEMENT

Environmental Management program activities represent crosscut activities associated with all waste types and not directly in support of specific base operations or projects. These activities can be categorized into the following groups: Area Support, Regulatory Support, Environmental Restoration and Decommissioning Contractor Training, Quality Assurance for Environmental Restoration, Transition and Decommissioning Departments, Special Projects/Citizens Advisory Board, Federal Facility Compliance Agreement Management, Waste Minimization, and Waste Certification.

Program management services are tracked and charged to the projects through the budgets for waste management and environmental restoration activities. However, for the purposes of this report, program management activities were estimated at 20 percent for FY1995 - FY 2000. The outyear estimates were calculated using a factor provided by the model.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Fernald.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	8,314	10,585	10,453	6,638	2,200	268	6	200,635

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

**Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	45,634	16,747	20,149	9,996	0	0	0	508,270
Waste Management	8,507	6,113	6,356	6,184	5,120	271	23	171,374
Nuclear Material and Facility Stabilization	27,598	17,816	32,331	575	0	0	0	419,198
Directly Appropriated Landlord	27,202	34,800	34,800	34,800	20,000	4,000	0	805,211
Program Management	8,314	10,585	10,453	6,638	2,200	268	6	200,635
Total	117,255	86,061	104,090	58,193	27,320	4,538	29	2,104,688

* Costs reflect e five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year everage.

** Totel Life Cycle is the sum of ennual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	419	0	0	1,122	4,022	935	0	32,913
Nuclear Material and Facility Stabilization	0	0	448	529	0	0	0	4,888
Total	419	0	448	1,652	4,022	935	0	37,802

* Costs reflect a five-year average in constant 1995 dollars, except in FY 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

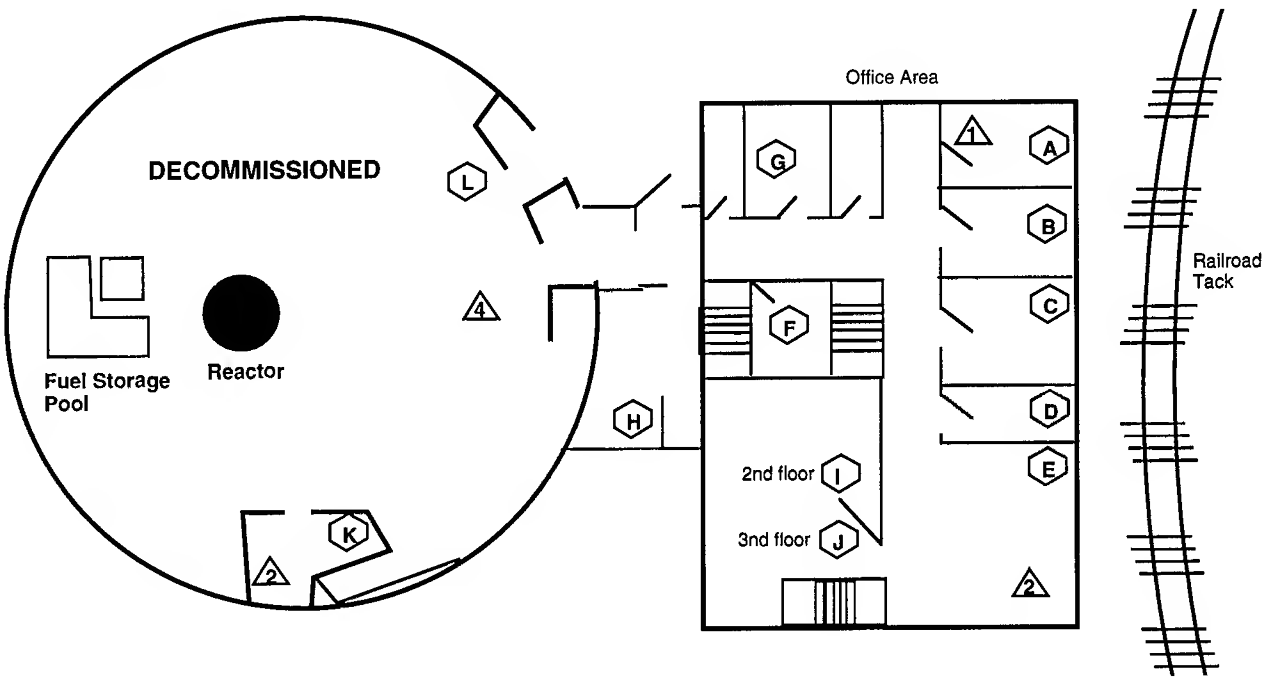
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration:		Fiscal Year
All Operable Units	Remedial Investigation Report (RIR) Submitted to EPA	1996-2007
All Operable Units	Feasibility Study Report/Proposed Plan Submitted to EPA	1996-2007
Operable Unit 1: Area B	Assessment Completed	1999
Operable Unit 2: Main Hill	Assessment Completed	2000
Operable Unit 4: Miami-Erie Canal	Assessment Completed	2007
Operable Unit 5: South Property	Assessment Completed	2005
Operable Unit 6: Decommissioning Sites	Assessment Completed	2006
Operable Unit 9: Site-wide and Offsite Activities	Assessment Completed	2015
Operable Unit 1: Area B	Remediation Completed	1999
Operable Unit 2: Main Hill	Remediation Completed	2003
Operable Unit 4: Miami-Erie Canal	Remediation Completed	2008
Operable Unit 5: South Property	Remediation Completed	2015
Operable Unit 6: Decommissioning Sites	Remediation Completed	2006
Operable Unit 9: Site-wide and Offsite Activities	Remediation Completed	2010
Waste Management:		Fiscal Year
Federal Facility Compliance Act	Submit Proposed Site Treatment Plan to the State of Ohio	1995
Waste Characterization	Complete Drum Opening Facility	1995
Site Treatment Plan Development	Packed Bed Reactor Title I Complete	1995
Site Treatment Plan Development	Packed Bed Reactor Title II Complete	1995
Site Treatment Plan Development	Complete Glass Melter Operating Procedures	1995
Site Treatment Plan Development	Start Glass Melter ORR	1995
Site Treatment Plan Development	Complete Tritium Capture Waste Inventory Report	1995
Site Treatment Plan Development	Complete Construction on Building 72	1995
	Waste Management Activities Completed	2030

For further information on this site, please contact: *Public Participation Office* *(505) 845-5951*
Public Affairs Office *(513) 648-3153*
Technical Liaisons: Bill Rummell/Art Kleinreth *(513) 865-3597*

PIQUA NUCLEAR POWER FACILITY

The Piqua Nuclear Power Facility is located in Piqua, Ohio. It is managed by Department of Energy's Chicago Operations Office.



Estimated Site Total

Five-Year Averages (Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	12	12	13	14	14	14

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	12	16	0	0	0	0	0	152

** *Costs reflect a five-year average in constent 1995 dollers, except in FY 1995-2000, which is a six-year average.*

*** *Total Life Cycle is the sum of ennuel costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

Piqua Nuclear Power Facility contained a 45.5 megawatt (thermal) organically cooled and moderated reactor built and operated as a demonstration project by the U.S. Atomic Energy Commission between 1963 and 1966. The Piqua Nuclear Power Facility was owned by the Atomic Energy Commission and operated under contract by the City of Piqua. Operations were discontinued in 1966, and the contract with the City of Piqua for operation and maintenance of the facility was terminated in 1967.

The Piqua Nuclear Power Facility was dismantled and decommissioned between 1967 and 1969; the reactor fuel, coolant, and most of the radioactive materials were removed from the site. Piping and equipment inside the reactor building were removed or decontaminated. The reactor vessel, concrete shielding, and fixed components within the reactor vessel were left in place, securely contained in the reactor complex. The main floor of the reactor building was covered by a waterproof material and a layer of concrete to render the areas containing the radioactive material completely inaccessible to water and personnel. The reactor vessel and the spaces between the vessel and the cavity liner were filled with dry, quartz sand to reduce condensation from moisture "breathed" in and to hold such moisture near its entry point if it does enter. Before placing the top shield plug, a "time capsule" was placed on top of the reactor vessel. The "time capsule" contains engineering documents, drawings, and photographs describing the reactor complex structure in detail.

The Piqua Nuclear Power Facility is currently undergoing routine surveillance and maintenance under the Department of Energy's (DOE) Environmental Management program.

Based on a 1968 contract with the Atomic Energy Commission and the City of Piqua, once radioactive materials have decayed, the facility will be returned to the City of Piqua.

The use of the property carries an absolute prohibition against breaching the barrier that encloses the radioactive source. This prohibition is expected to remain in place indefinitely. The Environmental Management mission at the site is currently scheduled to end in FY 2005, and no further activities are planned. At that time, the site would be transferred to the City of Piqua.

ENVIRONMENTAL RESTORATION

There is currently no contamination in evidence outside the containment structure at Piqua Nuclear Power Facility. Radiological contaminants consist of activation products dispersed in the stainless steel materials that constituted the reactor vessel and its internals. Lesser amounts of activation products are dispersed in the carbon steel thermal shield and guard vessel that surround the reactor vessel, in the compartment liner itself, and in the reinforcing bar and concrete outside the reactor compartment. The inventory of primary radionuclides remaining in the storage structure includes iron-55, cobalt-60, carbon-14, and beryllium-10.

Current activities consist of annual collection and analysis of radiological smears, sump water and sludge samples, facility tap water samples, radiation surveys, radon samples, and visual inspection of the containment structure. Annual surveillance and maintenance activities are expected to conclude in 2005. No further action is planned at this time.

WASTE MANAGEMENT

There are no waste management activities at the Piqua Nuclear Power Facility. No waste is currently generated, treated, or stored, and there are no plans to do so.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The Piqua Nuclear Power Facility currently has no nuclear material and facility stabilization activities.

LANDLORD FUNCTIONS

Landlord activities at the Piqua Nuclear Power Facility are the responsibility of the City of Piqua.

PROGRAM MANAGEMENT

Program management at Piqua Nuclear Power Facility consists of annual review of the subcontract for sampling and inspection, and review of the analytical results. These activities are accomplished by DOE Chicago Operations Office staff on a level-of-effort basis.

FUNDING AND COST INFORMATION

The following tables present current and projected funding information and major Environmental Management program activity and project costs projected through 2100 for the Piqua Nuclear Power Facility.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	12	16	0	0	0	0	0	152

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

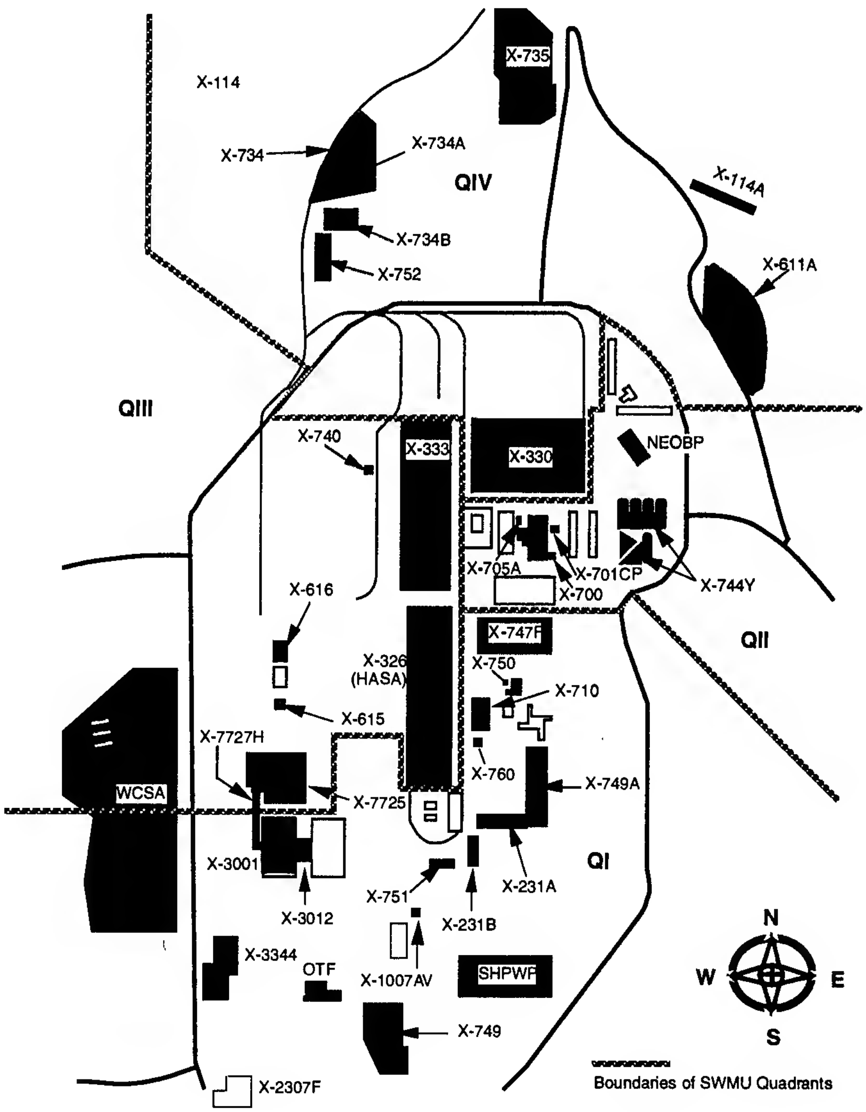
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Submit Final Report upon Conclusion of Monitoring	2005
	Release the Site to City of Piqua Submit Final Report	2005

For further information on this site, please contact: *Public Participation Office* *(708) 252-8796*
Public Affairs Office *(708) 252-2013*
Technical Liaison: Michael Ferrigan *(708) 252-2570*

PORTSMOUTH GASEOUS DIFFUSION PLANT

The Portsmouth Gaseous Diffusion Plant lies 20 miles north of Portsmouth, Ohio, and 70 miles south of Columbus, Ohio. It occupies approximately 3,700 acres.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	68,600	74,400	67,800	86,400	84,400	103,700
Program Management	6,900	12,100	12,200	18,700	18,300	15,800
Total	75,500	86,500	80,000	105,100	102,700	119,500

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% ennuel inflation.

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	74,708	73,938	133,045	229,811	222,641	246,046	207,444
Program Management	12,858	14,929	19,688	36,421	34,723	48,248	71,630
Total	87,567	88,867	152,733	266,232	257,364	294,295	279,074

	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	165,401	42,414	12,309	1,667	1,599	1,065	0	7,135,148
Program Management	57,304	10,487	4,719	655	0	0	0	1,571,173
Total	222,705	52,901	17,028	2,323	1,599	1,065	0	8,706,321

** Costs reflect a five-yeer average in constant 1995 dollars, except in FY 1995-2000, which is e six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Construction of the Portsmouth Gaseous Diffusion Plant began in late 1952. First cell on stream was realized in September, 1954. A gas centrifuge uranium enrichment program was established in the 1980's at Portsmouth. However, full operation was never implemented.

The principal mission of the Portsmouth Gaseous Diffusion Plant is the separation of uranium isotopes by gaseous diffusion. The process produces enriched uranium used as fuel in commercial powerplants. Although the plant is now managed by the U.S. Enrichment Corporation, environmental restoration and related waste management activities are conducted by the Department of Energy (DOE). These activities are focused on the cleanup of environmental pollution as well as the decommissioning of inactive and surplus facilities.

The current mission of the Portsmouth plant will continue until the separation of uranium isotopes is no longer needed by U.S. Enrichment Corporation or the Federal Government. The future land use of the site will be determined at a later date. However,

since long-term surveillance, maintenance, and institutional controls will continue indefinitely, limiting future uses, it is assumed that the site will be used by the Federal Government for some type of industrial activity.

ENVIRONMENTAL RESTORATION

The cleaning and changeout of process equipment at the Portsmouth plant generated spent solvents and other contaminants that were disposed of in onsite landfills and surface impoundments. The contaminants include chlorinated solvents, such as trichloroethylene, chlorinated solvents mixed with radionuclides in low concentrations, metals, and polychlorinated biphenyls (PCBs). Additional sources of contamination are uranium deposits in process equipment and radionuclides in buildings, cooling towers, burial grounds, and wastewater ponds. Trichloroethylene is the main contaminant of concern in the ground-water systems at the Portsmouth site. To date, no ground-water contamination has migrated offsite.

Potential Release Sites and Their Remediation

To facilitate remediation and the restoration process, the site was divided into four quadrants based in large part on ground-water flow. Quadrants with the greater potential risk from ground-water contamination have higher priority and are investigated first.

The initial investigations for each potential release site, directed at identifying the contaminants, the extent of their migration, and their sources have been completed and initial corrective-measures are underway.

Soon after environmental restoration started, five of the potential release sites were identified as requiring no further action. Since then, four more sites (chromium sludge lagoons, a facility for the disposal of contaminated materials, a facility for the disposal of classified materials, and an incinerator) have been certified for closure. Remedial actions have been completed at three other sites (an unrestricted and restricted-waste storage facility, a waste-oil tank, and a storage facility).

Specific remedial actions have been identified for five other potential release sites. A permanent cap is to be installed, by spring 1997, on the oil bioremediation plot where microorganisms have been used to digest the oil contaminant. Similarly, an engineered cap is to be emplaced over the landfill. Waste will be removed from four other sites including a holding pond, a radiological storage yard, a neutralization pit, and a waste-neutralization pit.

Underground and Aboveground Storage Tanks

There are 10 underground and aboveground storage tanks within the scope of the environmental restoration activity at Portsmouth. Three of these tanks were never placed into service and are to be removed. One other underground storage tank did not pass tightness tests and has been since removed. Six abandoned aboveground storage tanks will also be demolished. Surrounding soils will be characterized and, if necessary, excavated and treated according to regulatory limits on petroleum contamination in soil.

Decommissioning

Currently one abandoned facility, the X-705 incinerator and storage pad, is scheduled for demolition. Its structures, utilities, and equipment will be removed.

Eventually, when the uranium-enrichment processes are no longer needed, the Portsmouth plant will be shut down and decommissioned. Under provisions in the United States Enrichment Corporation lease of the plant, the stabilization or shutdown activities are the responsibility of the leasee. Before decontamination, highly enriched uranium will be removed. After an orderly shutdown, including the removal of the residual uranium from the interior of the process equipment, all contaminated process equipment will be transported to a single decontamination facility to be constructed and operated on the Oak Ridge Reservation. After decontamination and volume reduction, the wastes will be returned to the Portsmouth site for disposal.

The process buildings remaining after the removal of the process equipment and auxiliaries will then be decontaminated. It is assumed all interior surfaces are contaminated. Radioactive and other hazardous materials will be removed and disposed in approved disposal

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration							
Assessment	11,746	12,391	987	371	54	0	0
Remedial Actions	16,074	17,238	4,018	148	0	2	826
Facility Decommissioning	0	16,548	108,928	213,977	220,666	244,749	206,618
Long-Term Surveillance and Monitoring	1,113	1,109	1,074	785	626	0	0
Facility Decommissioning	4,992	4,525	17,299	11,542	0	0	0
Waste Management	40,784	19,468	707	0	0	0	0
Surveillance and Maintenance	0	2,659	32	2,988	1,295	1,295	0
Total	74,708	73,938	133,045	229,811	222,641	246,046	207,444

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration								
Assessment	287	1,810	1,667	1,667	1,599	1,065	0	179,952
Remedial Actions	2,805	40,604	10,642	0	0	0	0	477,85
Facility Decommissioning	162,309	0	0	0	0	0	0	5,868,976
Long-Term Surveillance and Monitoring	0	0	0	0	0	0	0	24,65
Facility Decommissioning	0	0	0	0	0	0	0	196,777
Waste Management	0	0	0	0	0	0	0	345,582
Surveillance and Maintenance	0	0	0	0	0	0	0	41,349
Total	165,401	42,414	12,309	1,667	1,599	1,065	0	7,135,148

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

facilities. The major hazardous materials are asbestos, which is found in the insulation for piping systems and in the transite siding of all the buildings, and PCBs, which are found throughout the electrical equipment, the ventilation systems of the process buildings, and in local areas of the floors of these buildings. The facilities will be treated to remove surface contamination to allow for unrestricted release. Building materials like transite siding and the roofing are likewise contaminated and will be totally removed. All that will remain will be the superstructure of the facilities.

Surveillance and Maintenance

A surveillance and maintenance program has been implemented to inspect and repair potential release sites already cleaned up or that require no further action. These sites are the sludge lagoons, the contaminated materials disposal facility, the classified-materials disposal facility, and the oil biodegradation plot. Other sites will be added to the long-term surveillance and maintenance program as corrective actions are completed. Surveillance and maintenance will continue, as required, for verification of completeness of the corrective action. Gas centrifuge enrichment program facilities destined for decommissioning are undergoing surveillance and maintenance. (The decommissioning cost for these facilities are not included in this estimate pending formal designation as surplus facilities.)

Ground-Water Protection

A ground-water protection program has been established for the Portsmouth site. Its purpose is to coordinate and support environmental restoration projects concerned with or affecting the ground water. This program is also responsible for the operation and maintenance of the ground-water treatment facilities at the Portsmouth plant. Any interim actions required to stop the migration of ground water offsite also are managed under this program.

Ground water is sampled at specific wells installed in and around the plant to determine the extent of any contamination, to identify the contaminants, and to determine their sources. The characterization effort has been helped by the potential release site investigations performed for the environmental restoration activity. Additional ground-water sampling will be required to monitor rate of contaminants and to determine the extent of contamination.

WASTE MANAGEMENT

Waste management activities at the Portsmouth Gaseous Diffusion Plant are conducted within the scope of environmental restoration activities. They involve waste generated from plant operations before July 1, 1993. The types of waste include transuranic waste, low-level radioactive waste, low-level mixed waste, hazardous chemical waste, sanitary waste, and industrial waste. All generated waste is characterized and labeled by type at the site of generation or accumulation. All waste shipped offsite for disposal must be certified to meet the acceptance criteria for disposal at the particular disposal facility.

Two new waste-management facilities will be constructed at the Portsmouth plant. These include a facility for sorting and repackaging low-level mixed waste and a facility for housing equipment used for handling hazardous and radioactive waste.

Treatment, Storage and Disposal Operations

The waste streams to be treated include selected aqueous wastes, contaminated soils, organic liquids, and contaminated sludges. For low-

level mixed waste and hazardous chemical waste, the goal of treatment is to meet Resource Conservation and Recovery Act land disposal restrictions.

Low-level radioactive waste will continue to be treated to stabilize the waste and to reduce its volume. Low-level waste will be shipped to DOE's Hanford facility in Washington State.

Liquid and solid mixed waste will be sent to the K-25 Site at the Oak Ridge Reservation in Tennessee or to an approved commercial facility, if available. In addition, mobile treatment trains for mixed waste may also be used at the Portsmouth site.

Four onsite storage facilities will manage the waste generated by environmental restoration activities until disposal can be completed. Storage-related activities include waste handling, placement of wastes into storage, maintenance and surveillance of storage facilities, procurement of handling equipment, and realignment of existing storage.

Sanitary waste, metal, wood, rubbish (including asbestos) will be disposed of in the onsite solid-waste landfill or in construction-spoils areas. Low-level radioactive waste will be shipped to DOE's burial grounds at the Hanford Site, and transuranic waste will be shipped to the Waste Isolation Pilot Plant. The low-level mixed waste and hazardous waste treated at the K-25 Site will be disposed in the same way as other Toxic Substance Control Act waste. The remaining mixed and hazardous chemical waste will be disposed at the commercial facility where they are treated.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

As stated in the lease dated July 1, 1993, the U.S. Enrichment Corporation is responsible for removing all waste created during their operations and cleaning the facilities at Portsmouth. When the facilities are transferred to DOE, this report assumes they will pass directly into the decommissioning program, negating the requirement for any nuclear material and facility stabilization activities.

LANDLORD FUNCTIONS

The landlord at the site is the DOE Nuclear Energy program.

PROGRAM MANAGEMENT

Program management, through the technical integration and contract management functions, provides essential technical support, administrative integration, and oversight to environmental restoration and waste management. This support is aimed at ensuring the proper identification, characterization, remediation, and revitalization of contaminated sites. It includes technical programs, technical oversight, community relations, the integration of environmental restoration with waste management, and business management.

FUNDING AND COST INFORMATION

The following tables present current and projected funding information and major Environmental Management program activity and project costs projected through 2100 for the Portsmouth Gaseous Diffusion Plant.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	12,858	14,929	19,688	36,421	34,723	48,248	71,630

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Program Management	57,304	10,487	4,719	655	0	0	0	1,571,173

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constent 1995 dollars.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmentol Restorotion	74,708	73,938	133,045	229,811	222,641	246,046	207,444
Progrom Monagement	12,858	14,929	19,688	36,421	34,723	48,248	71,630
Totol	87,566	88,867	152,733	266,232	257,364	294,295	279,074

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmentol Restorotion	165,401	42,414	12,309	1,667	1,599	1,065	0	7,135,148
Progrom Monagement	57,304	10,487	4,719	655	0	0	0	1,571,173
Totol	222,705	52,901	17,028	2,323	1,599	1,065	0	8,706,321

* *Costs raflect e five-yeer everage in constant 1995 dollars, except in FY 1995-2000, which is e six-yeer everege.*

** *Totel Life Cycle is tha sum of annual costs in constent 1995 dollars.*

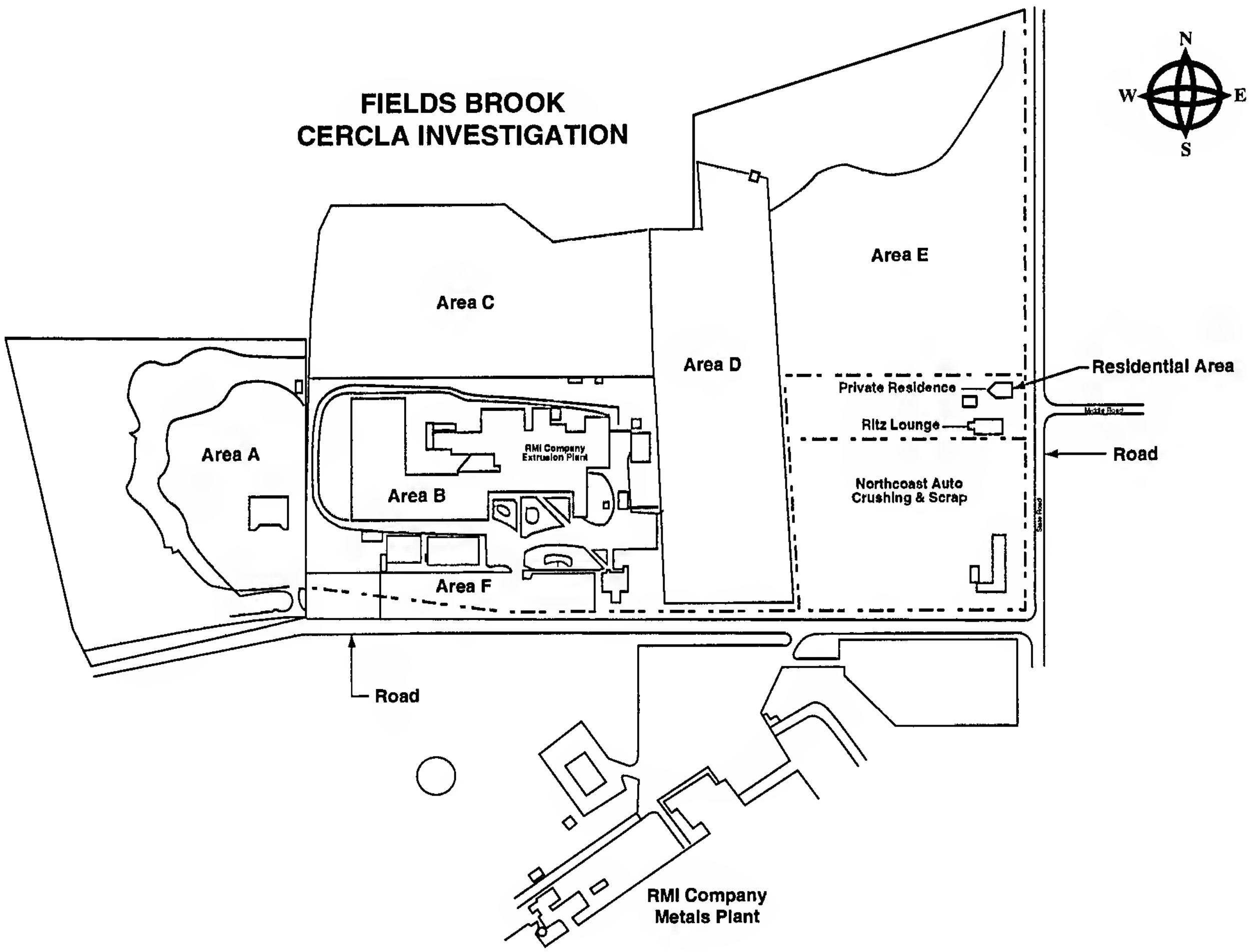
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmentol Restoration		Fiscal Yeor
	Portsmouth RCRA (New) Closures - Remediation Complete	1999
	Consent Decree (Old) Closures - Remediation Complete	1999
	Portsmouth Tonks - Remediation Complete	1996
	Complete Gos Centrifuge Enrichment Progrom Decommissioning	2015
	Complete all Environmental Restorotion Activities	2060

For further information on this site, please contact: *Public Participation Office* *(615) 576-1590*
Public Affairs Office *(615) 576-0885*
Technical Liaisons: *John Sheppard* *(615) 897-5510*
Bill Cahill *(615) 241-4830*

REACTIVE METALS, INC.

Reactive Metals, Inc. (RMI Titanium Co.) Extrusion Plant is located in northern Ashtabula County, Ohio, about 3 miles northeast of the center of the City of Ashtabula and approximately 1 mile south of Lake Erie. The plant is located in a sparsely populated and highly industrialized area, with a number of chemical production and metal conversion plants located nearby.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	3,890	8,695	10,679	11,886	12,719	13,101
Program Management	2,700	2,429	2,423	2,002	2,002	2,062
Total	6,590	11,124	13,102	13,888	14,721	15,163

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenerio, costs for shaded area essume 3% ennual inflation.

*Five-Year Averages (Thousands of Canstant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	7,466	10,635	6,089	68	474	749	0	134,876
Program Management	2,122	2,255	1,434	0	0	0	0	31,177
Total	9,588	12,890	7,523	68	474	749	0	166,053

** Costs reflect a five-year everege in constant 1995 dollars, except in FY 1995-2000, which is e six-year average.

*** Total Life Cycle is the sum of ennual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The Reactive Metals, Inc. Titanium Co. (RMI) Extrusion Plant produced uranium billets and refined them into various sizes and shapes for use by the Department of Energy (DOE) and its predecessor agencies from 1962 to 1988.

The current mission of the RMI Decommissioning Project is to safely remove the extrusion facility from service and to reduce residual radioactive and organic contamination to a level that permits the extrusion facility, site, and adjacent areas to be released for unrestricted use. Decommissioning activities, as well as remediation, at the RMI site are projected to be complete by the year 2025. At that time, the facilities will be returned to RMI.

ENVIRONMENTAL RESTORATION

The RMI facility consists of buildings and equipment that have both radiological and chemical contamination. Contamination is a result of past extrusion activities, which consisted of heating uranium metal, forcing it into various molds, and machining the shape to refine it for use by DOE's office of Defense Programs. Transport mechanisms include fugitive dust, leaching from soils into ground water, and surface transport into sediments. The primary media of concern are facilities and equipment, soils, and ground water. Contaminants of concern include uranium and technetium-99, and trichloroethylene; barium chloride and lead may also be of concern.

Remediation of a proposed Corrective Action Management Unit has been identified as part of the facility's Resource Conservation and Recovery Act Part B permit. The Corrective Action Management Unit consists of a small wastewater evaporation pond used during past extrusion plant operations, a swale north of the evaporation pond, and a seepage pond at the base of the escarpment north of the extrusion plant. Sampling and analysis have indicated both soils and ground water are contaminated with trichloroethylene, uranium, and technetium-99.

RMI expects to remove radiological and hazardous contaminants from the site and from adjacent property to permit future unrestricted use consistent with regulatory and contractual obligations. The cost estimate assumes the required technology to complete these activities will be available.

Facility equipment will be decontaminated and released for unrestricted use, packaged and disposed as low-level waste, or disposed in accordance with applicable regulations. Buildings below the unrestricted release criteria for radiological contaminants may be left onsite. Most buildings will be disassembled and removed from the site. Contamination on the slab and sub-slab will also be removed. These activities are expected to be completed in 2025.

Soils characterization for hazardous and radiological constituents will be completed, and soils will be excavated and packaged for disposal. Excavated areas will be filled with clean backfill. Soils remediation is expected to be completed in 2010. Ground-water characterization will be completed, and an appropriate remediation technology selected. Ground-water remediation is scheduled for completion by 2020. The degree of contamination and the potential threat to workers and the public is being assessed as part of the characterization activities.

WASTE MANAGEMENT

Treatment, Storage, and Disposal Operations

Waste generated by decommissioning and remediation activities will be shipped to approved hazardous waste or radiological waste treatment and/or disposal facilities. RMI has no plans to construct long-term treatment, storage, or disposal facilities at its location. Waste handling activities at RMI are funded and managed within the scope of environmental restoration and will conclude when the environmental restoration activities are completed.

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	1,834	0	0	0	0	0	0	11,007
Surveillance And Maintenance	0	0	0	0	0	749	0	3,747
Facility Decommissioning	5,632	10,635	6,089	68	474	0	0	120,123
Total	7,466	10,635	6,089	68	474	749	0	134,876

* Costs raflect a five-yaar averege in constant 1995 dollars, axcapt in FY 1995-2000, which is a six-yaar avaraga.

** Total Life Cycle is tha sum of ennual costs in constant 1995 dollars.

No waste is treated onsite, and there are no plans to construct treatment facilities onsite. All waste is sent offsite for treatment, as necessary, prior to disposal. Wastes are collected; reduced in volume; and packaged, classified, and stored temporarily pending offsite shipment to appropriate treatment and/or disposal facilities. Radioactive waste is shipped to DOE's Nevada Test Site, and hazardous waste is sent to appropriate commercial facilities.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities at the RMI site.

LANDLORD FUNCTIONS

Landlord/Infrastructure costs are currently funded within the scope of environmental restoration activities. These "site services" costs include security for buildings and grounds, maintenance and testing of site equipment, maintenance of site utilities, and equipment procurement. Landlord costs will end by 2025 when the environmental restoration activities are completed.

PROGRAM MANAGEMENT

Program management at RMI is concerned with decontamination and remediation planning, project control, and decommissioning management. RMI does not fund any grants or Agreements-In-Principle at this time. The miscellaneous area includes general and administrative, fee, contingency, and project oversight.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the RMI Titanium Co., Extrusion Plant.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	2,122	2,255	1,434	0	0	0	0	31,177

* *Cost shown include progrem management costs with eech project.*

** *Costs reflect a five-year everage in constant 1995 dollars, except in FY 1995-2000, which is e six-year everege.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	7,466	10,635	6,089	68	474	749	0	134,876
Program Management	2,122	2,255	1,434	0	0	0	0	31,177
Total	9,588	12,890	7,523	68	474	749	0	166,053

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Submit Corrective Action Management Unit Design to EPA	1997
	Complete Soil Remediation	2010
	Complete Decommissioning Activities	2025

For further information on this site, please contact: Public Participation Office (708) 252-8796
Public Affairs Office (708) 252-2010
Technical Liaison: Michael Ferrigan (708) 252-2570

OHIO FUSRAP SITES

Alba Craft, Associate Aircraft, Baker Brothers, B&T Metals, HHM Safe Company, Luckey, and Painesville constitute the Ohio sites within the Formerly Utilized Sites Remedial Action Program (FUSRAP). The program was established in 1974 under the provisions of the Atomic Energy Act to identify previously decontaminated Manhattan Engineer District and Atomic Energy Commission sites, to reevaluate their radiological condition, and to take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States and is funded through the Oak Ridge Operations Office.

The model used to estimate costs for this report provides one cost for all of the FUSRAP sites located in each State. All costs for waste management activities, program management, and relevant landlord activities attributable to the Department of Energy (DOE) are provided for within the scope of environmental restoration. There are no FUSRAP sites with either current or planned nuclear material and facility stabilization activity needs. Funding for all sites is 100 percent nondefense. For a general discussion of FUSRAP and associated costs, see the FUSRAP Site Summary found in the Tennessee section.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Ohio-FUSRAP	10,600	4,660	12,250	10,980	16,260	23,290

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Ohio-FUSRAP	12,955	18,773	19,520	0	0	0	0	269,194

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

Five-Year Averages (Thousands of Canstant 1995 Dollars)*

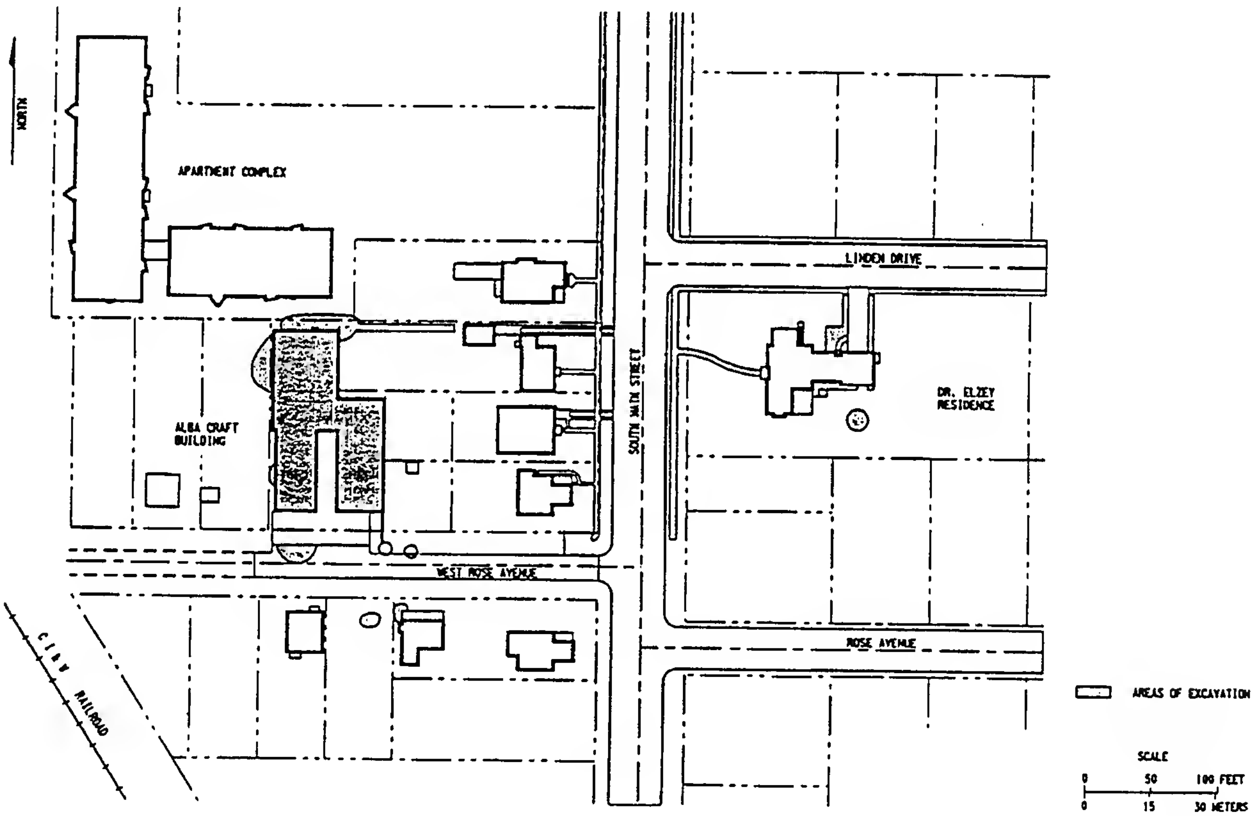
	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Ohio-FUSRAP	12,955	18,773	19,520	0	0	0	0	269,194

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

ALBA CRAFT LABORATORY
(Formerly Utilized Sites Remedial Action Program)

The Alba Craft site is located at 10-14 West Rose Avenue, Oxford, Ohio.



PAST, PRESENT, AND FUTURE MISSIONS

The former Alba Craft Laboratory facility was "U" shaped (open on the south side), with a total area of approximately 8,000 square feet. The facility is located in a residential neighborhood with an apartment building located approximately 20 feet from the rear of the building. Alba Craft provided a variety of machine shop services on uranium metal. Early work included general machining and developmental machining of threaded slugs from the Savannah River Site. Final operations were on a production scale and consisted of hollow drilling and turning of slugs for the Savannah River and Hanford reactors.

This site will be released for unrestricted use upon completion of the Certification Docket.

ENVIRONMENTAL RESTORATION

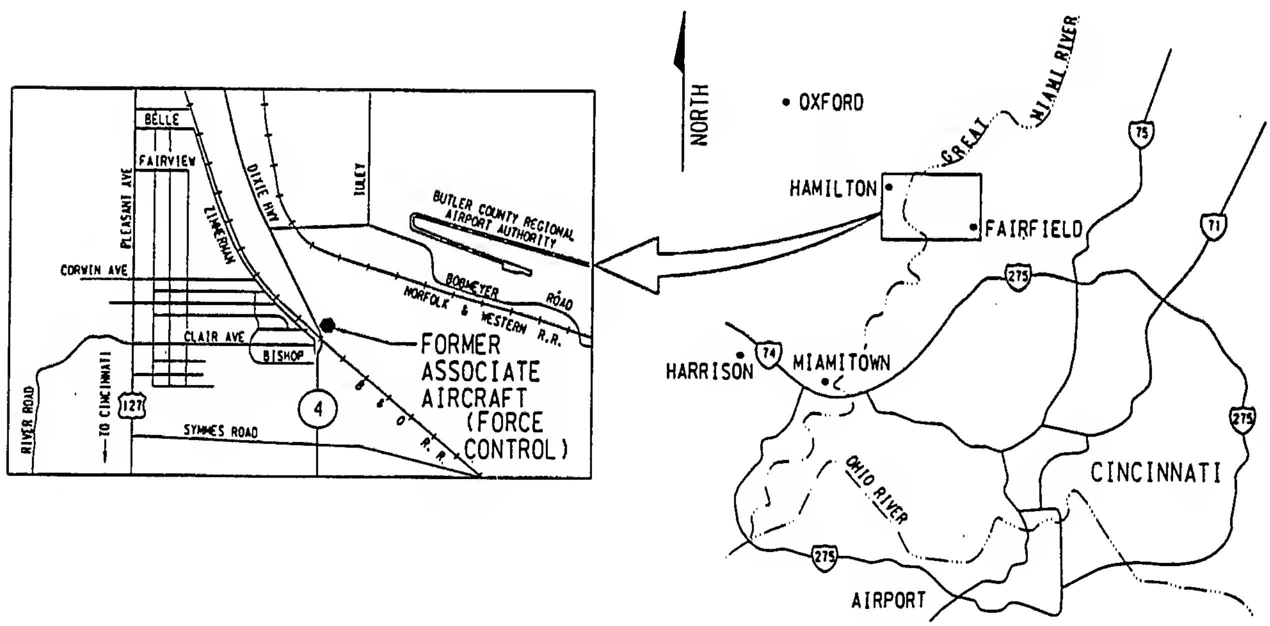
The outdoor portion of a 1992 survey found that soil samples contained residual radioactive contamination, with most occurring in the top 6 inches of soil. There are also gamma readings with no measurable beta, which indicates the presence of subsurface contamination. Generally, all of the old concrete is contaminated. The interior portion of the survey found that all floor surfaces were contaminated to some extent. Contamination of the walls was spotty and usually occurred near the floor. Window ledges, electrical switch boxes, old work benches, and other horizontal surfaces where dust could settle and be undisturbed showed uranium contamination. Most overhead structures such as electrical junction boxes, lights, and trusses were found to be contaminated.

Remediation of the Alba Craft Site was initiated in August 1994 and will be completed in 1995. Remediation to date has included decontamination and demolition of the building on the Alba Craft Site. Total waste volume was 2,800 cubic yards.

For further information on this site, please contact: *Public Participation Office* (615) 576-1590
Public Affairs Office (615) 576-0885
Technical Liaison: Melyssa Noe (615) 241-3315

ASSOCIATED AIRCRAFT TOOL MANUFACTURING
(Formerly Utilized Sites Remedial Action Program)

The former Associate Aircraft facility is located at 3660 Dixie Highway in Fairfield, Ohio, which is located near Cincinnati.



PAST, PRESENT, AND FUTURE MISSIONS

The facility is an active machine shop with a total area of approximately 25,000 square feet. In 1956, Associated Aircraft machined uranium slugs which included hollow drilling, reaming, and turning slugs for the Atomic Energy Commission. It is estimated that approximately 95,000 slugs were machined at this site during the eight-month period of operation. The machining work was confined to only part of the building. The facility has not been significantly altered since uranium machining operations took place.

The site will be released for unrestricted use following completion of cleanup.

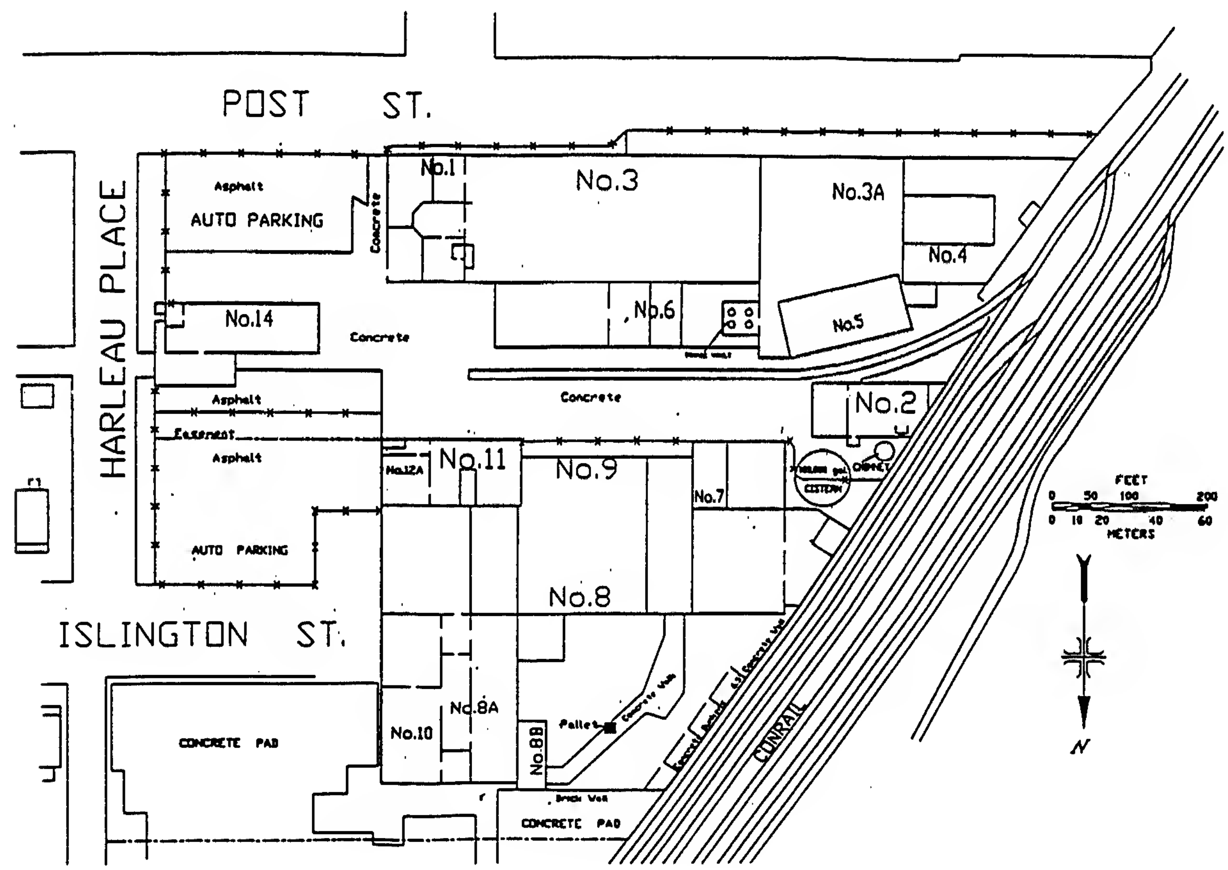
ENVIRONMENTAL RESTORATION

The waste volume is estimated to be 690 cubic yards of uranium contaminated material. Cleanup activities are currently underway.

For further information on this site, please contact: *Public Participation Office* *(615) 576-1590*
Public Affairs Office *(615) 576-0885*
Technical Liaison: Melyssa Noe *(615) 241-3315*

BAKER BROTHERS
(Formerly Utilized Sites Remedial Action Program)

The Baker Brothers site is located at 2551-2555 Harleau Place at the intersection with Post Street in Toledo, Ohio.



PAST, PRESENT, AND FUTURE MISSIONS

During the time that uranium fabrication work was conducted at Baker Brothers, the commercial site consisted of several 1920's buildings of brick with saw-tooth roofs and concrete floors. It was bounded to the northwest by several railroad tracks and a siding entered the site. Three of the four buildings used by Baker Brothers remain. The facility was used for machining large quantities of uranium rods to produce finished slugs in the mid 1940's. There is one vicinity property of this site, located in Ottawa Lake, Michigan.

This site will be released for unrestricted use upon completion of cleanup.

ENVIRONMENTAL RESTORATION

The waste volume is estimated to be 2,500 cubic yards and consists primarily of uranium-contaminated soil (classified as low-level radioactive waste).

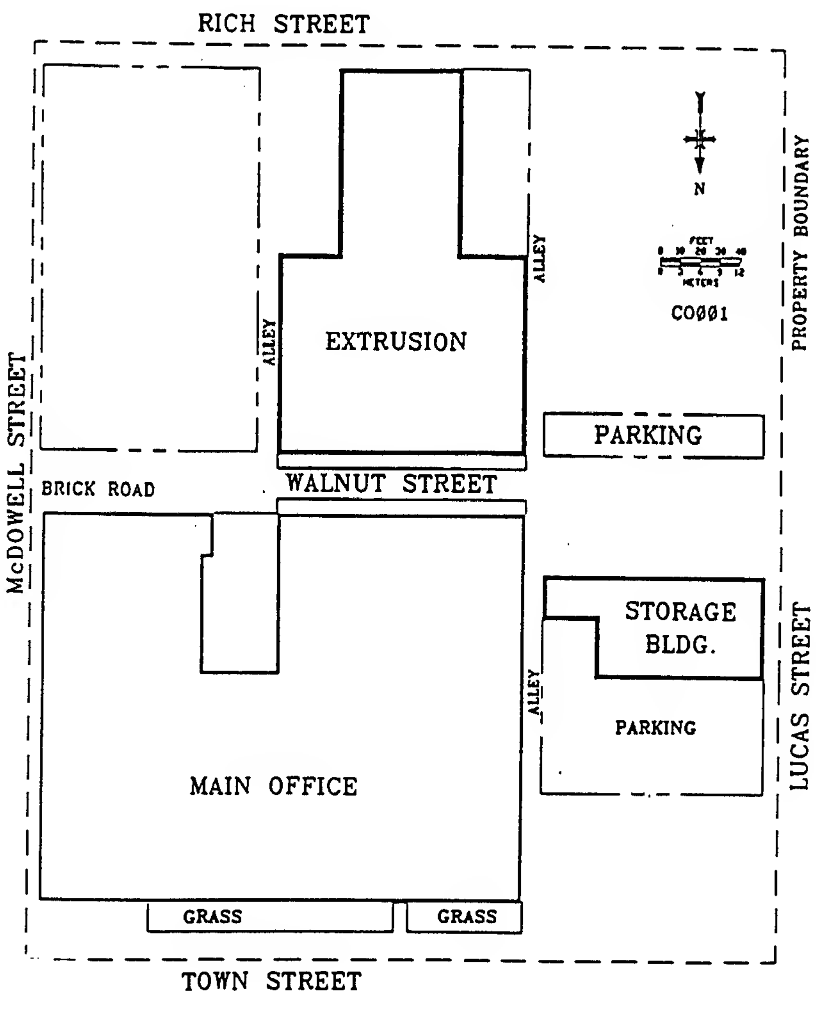
Remediation of the vicinity property has been completed.

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: Melyssa Noe	*(615) 241-3315*

B&T METALS
(Formerly Utilized Sites Remedial Action Program)

B&T Metals is located at 425 West Town Street on the southwest side of Columbus, Ohio.



PAST, PRESENT, AND FUTURE MISSIONS

As of 1988, the B&T Metals site consisted of three buildings: (1) the main office; (2) a storage building, and (3) an extrusion building, the latter of which did not exist at the time of the uranium work (extruding uranium billets into rods). The work was limited to the northwest corner of the main office building, the largest of the three structures. Approximately 168,054 tons of uranium billets were extruded into rods during the 1940's. Uranium fires were experienced during the extrusion process.

B&T Metals site will be released for unrestricted use following completion of cleanup.

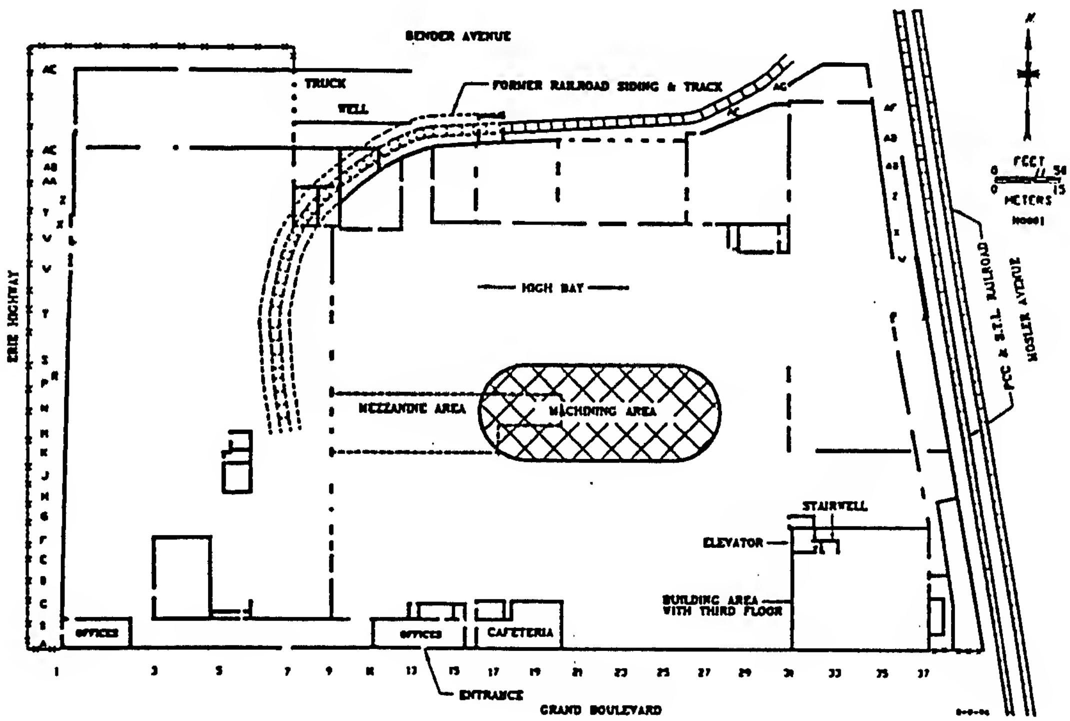
ENVIRONMENTAL RESTORATION

No remedial action has been conducted at this site to date. The waste volume is estimated to be 1,000 cubic yards and consists of uranium contaminated material.

For further information on this site, please contact: *Public Participation Office* *(615) 576-1590*
Public Affairs Office *(615) 576-0885*
Technical Liaison: Melyssa Noe *(615) 241-3315*

HHM SAFE COMPANY
(Formerly Utilized Sites Remedial Action Program)

The HHM Safe Company building is located in Hamilton, Ohio.



PAST, PRESENT, AND FUTURE MISSIONS

The former Herring-Hall-Marvin Safe Company machined uranium slugs from uranium billets for the Manhattan Project and the Atomic Energy Commission intermittently from the 1940's to the early 1950's. The relatively small-scale uranium matching stopped in August 1951.

The 300,000 square-foot facility was owned by Herring-Hall-Marvin Safe Company and sold at an unknown date to the Diebold Safe Company. In spring of 1994, Diebold sold the unoccupied facility to another party, while retaining interest in the property.

This site will be released for unrestricted use upon completion of the Certification Docket.

ENVIRONMENTAL RESTORATION

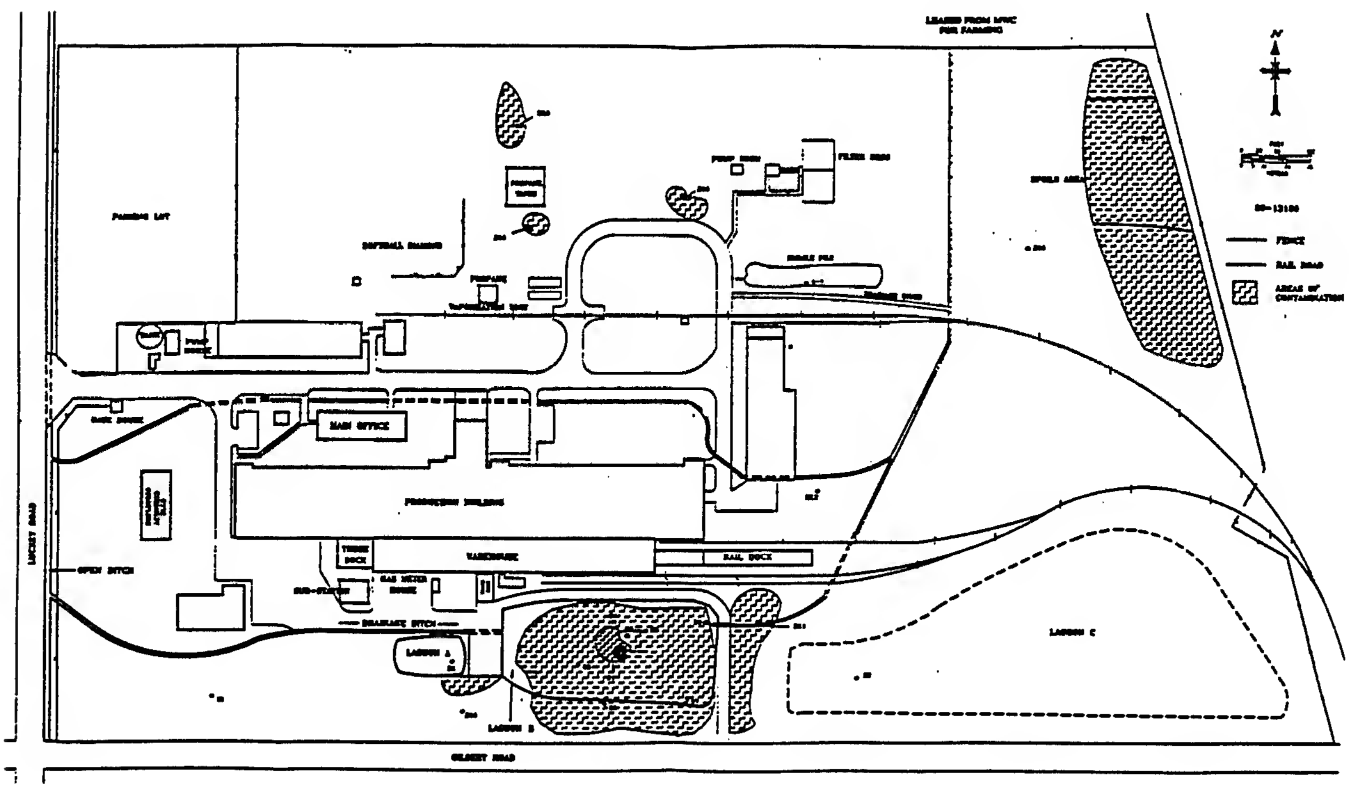
The first radiological surveys performed on the first and second floor resulted in spots of excess radionuclide concentrations that have already been removed. The third floor was surveyed later, and contamination was identified in several areas.

Remediation of the site was initiated in December 1994 and completed in 1995. Primary scope was decontamination of the third floor. Total waste volume was 20 cubic yards.

For further information on this site, please contact: *Public Participation Office* *(615) 576-1590*
Public Affairs Office *(615) 576-0885*
Technical Liaison: Melyssa Noe *(615) 241-3315*

LUCKEY
(Formerly Utilized Sites Remedial Action Program)

The site is located in Luckey, Ohio, approximately 22 miles southeast of Toledo, at 21200 Luckey Road.



PAST, PRESENT, AND FUTURE MISSIONS

The Luckey site is generally L-shaped and encompasses approximately 40 acres. Structures at the site include large production, warehouse and related buildings, transportation systems, and utility buildings. Several active and inactive lagoons and spoil areas are present. Numerous open areas are vegetated, mostly with grasses and brush. In 1951, about 1,000 tons of contaminated scrap steel was shipped from the Lake Ontario Storage Area to the Luckey site, to be used for controlling chlorine fumes at a Painesville, Ohio facility.

The site will be released for unrestricted use following completion of cleanup.

ENVIRONMENTAL RESTORATION

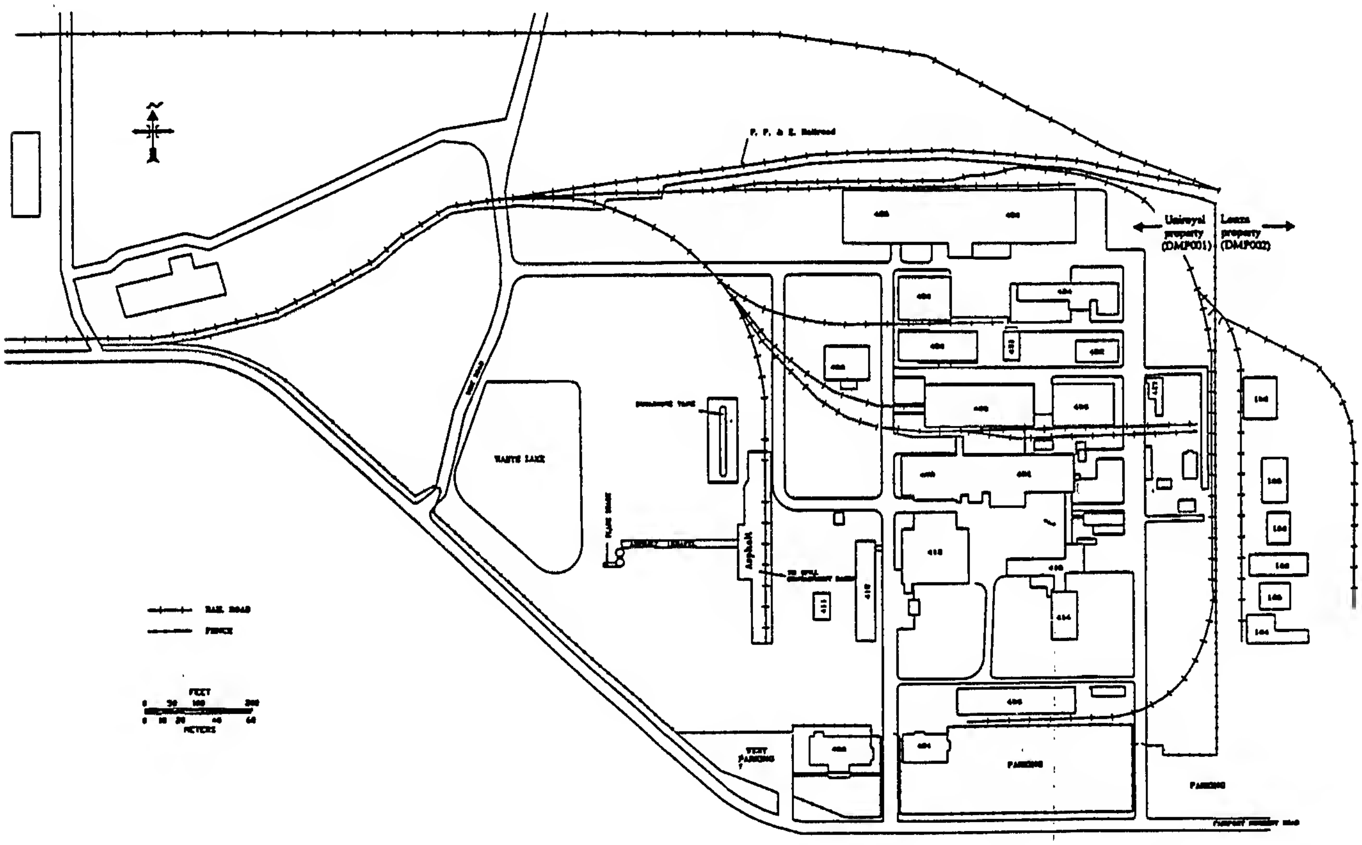
The waste volume is estimated to be 64,000 cubic yards and consists of beryllium ore and beryllium production residues and traces of uranium.

No remedial action has been conducted at the site to date.

For further information on this site, please contact: *Public Participation Office* *(615) 576-1590*
Public Affairs Office *(615) 576-0885*
Technical Liaison: Melyssa Noe *(615) 241-3315*

PAINESVILLE
(Formerly Utilized Sites Remedial Action Program)

The Painesville site is located approximately 22 miles northeast of Cleveland, at 720 Fairport-Nursery Road.



PAST, PRESENT, AND FUTURE MISSIONS

The Painesville site is the location of the formerly government-owned National Industrial Reserve Plant for magnesium production. About a third of the site's approximately 150 acres was covered by large buildings and rail lines. Some of the original buildings are still in use but others have been removed.

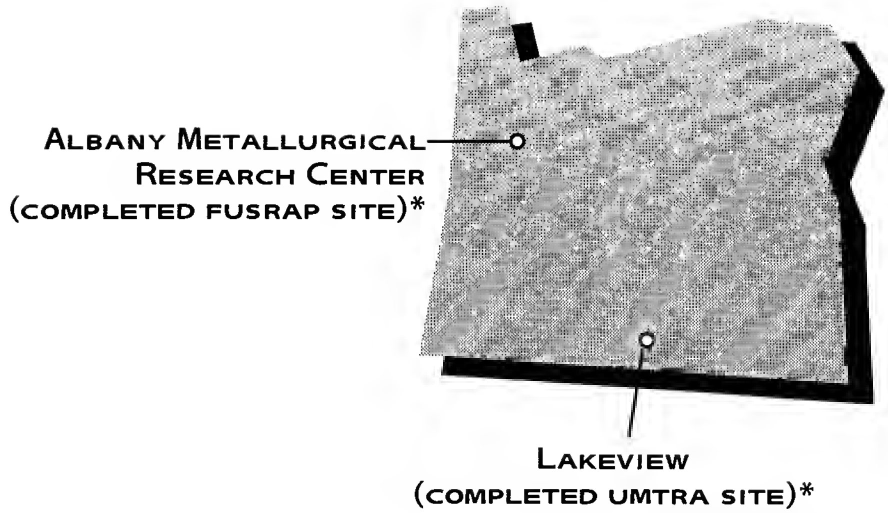
This site will be released for unrestricted use following completion of cleanup.

ENVIRONMENTAL RESTORATION

The waste volume is estimated to be 104,000 cubic yards and consists of uranium contaminated material.

No remedial action has been conducted at the site to date.

For further information on this site, please contact: *Public Participation Office* *(615) 576-1590*
Public Affairs Office *(615) 576-0885*
Technical Liaison: Melyssa Noe *(615) 241-3315*



*Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for these facilities are provided in the table below.

OREGON

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Completed UMTRA Surveillance & Monitoring	160	320	190	230	160	1,130

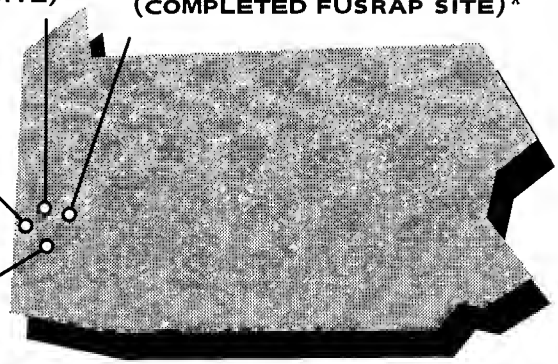
* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Completed UMTRA Surveillance & Monitoring	388	339	36	7	0	0	0	4,241

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*



*Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for these facilities are provided in the table below.

PENNSYLVANIA

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Completed UMTRA Surveillance & Monitoring	190	280	210	250	180	200
Pennsylvania-FUSRAP	780	190	0	0	0	0
Total	970	470	210	250	180	200

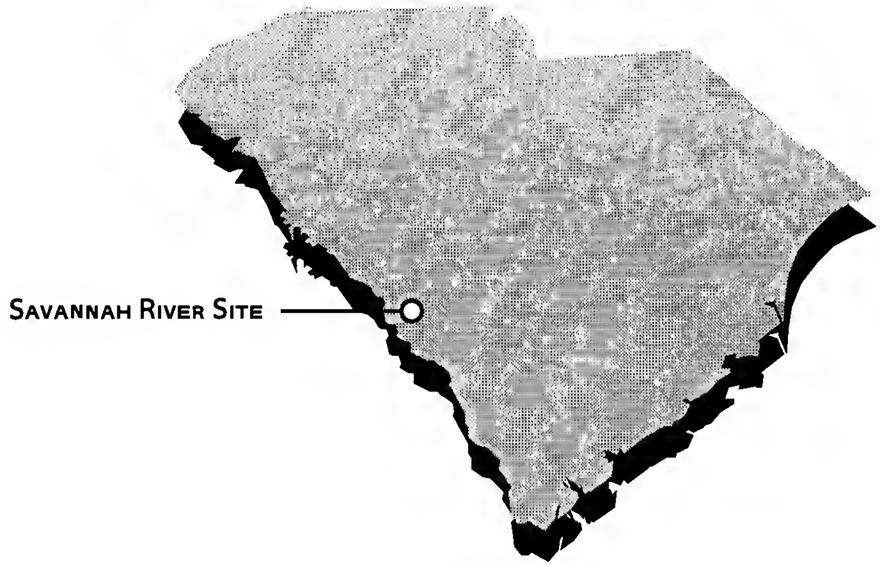
* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Completed UMTRA Surveillance & Monitoring	231	492	151	0	0	0	0	4,602
Pennsylvania-FUSRAP	160	0	0	0	0	0	0	961
Total	932	492	151	0	0	0	0	5,564

** *Costs reflect e five-year everege in constent 1995 dollers, except in FY 1995 - 2000, which is e six-yeer everege.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*



SOUTH CAROLINA

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Savannah River Site	721,200	1,275,600	1,516,600	1,599,100	1,651,100	1,774,500

* *Costs for FY 1995 reflect Congressionel Approprietion, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfell Scenerio, costs for sheded eree essume 3% annuel inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Savannah River Site	1,184,027	1,499,052	1,789,949	1,466,002	1,607,487	1,343,457	1,460,935	
	FY 2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle*****
Savannah River Site	1,223,712	988,743	403,294	324,737	19,906	0	0	67,640,532

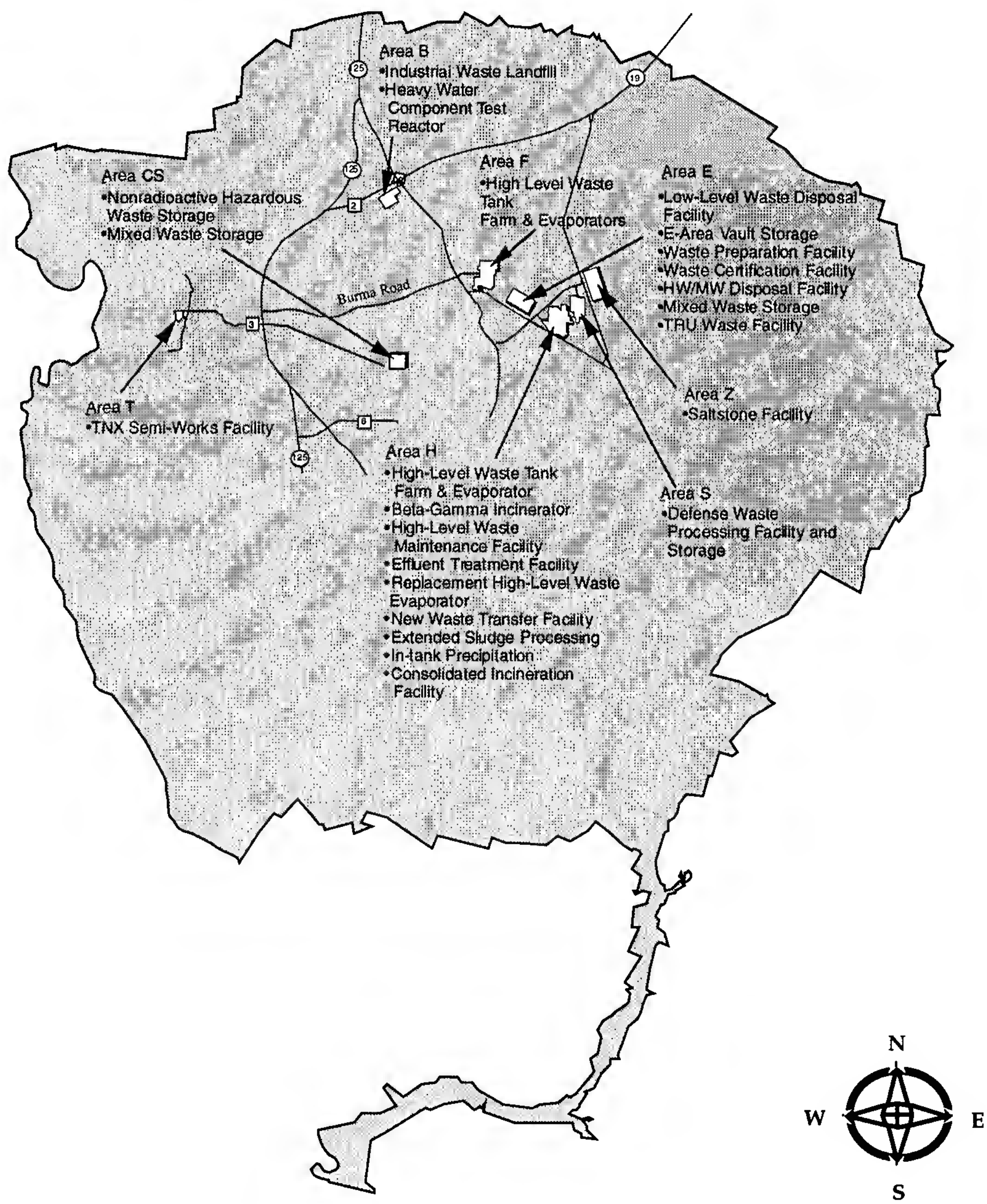
** *Costs reflect e five-year everage in constent 1995 dollars, except in FY 1995 - 2000, which is a six-year everage.*

*** *Totel Life Cycle is the sum of ennuel costs in constent 1995 dollars.*

SAVANNAH RIVER SITE

The Savannah River Site is located in west-central South Carolina and bordered on the southwest by the Savannah River. The closest major population centers are Aiken, South Carolina, and Augusta, Georgia. The total area of the site is approximately 325 square miles, with production facilities occupying less than 5 percent of the site.

SAVANNAH RIVER SITE



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	63,600	97,400	99,400	100,600	104,100	107,900
Waste Management	529,900	481,700	567,400	605,100	624,900	712,200
Nuclear Material and Facility Stabilization	0	332,000	421,000	444,600	459,900	476,000
Directly Appropriated Landlord	0	233,500	292,100	308,500	319,100	330,300
Program Management	127,700	131,000	136,700	140,300	143,100	148,100
Total	721,200	1,275,600	1,516,600	1,599,100	1,651,100	1,774,500

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	88,248	80,326	93,834	118,720	218,630	358,629	535,322
Waste Management	427,789	729,264	834,366	798,964	835,469	566,422	565,979
Nuclear Material and Facility Stabilization	324,209	232,978	364,772	18,669	12,556	27,886	287
Directly Appropriated Landlord	225,465	186,217	186,217	186,217	186,217	186,217	186,217
Program Management	118,317	270,267	310,761	323,433	354,615	204,304	173,130
Total	1,184,027	1,499,052	1,789,949	1,466,002	1,607,487	1,343,457	1,460,935

	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	613,927	504,154	226,811	36,602	5,872	0	0	14,493,617
Waste Management	291,689	195,262	115,946	272,065	9,998	0	0	28,643,853
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	5,230,981
Directly Appropriated Landlord	186,217	186,217	0	0	0	0	0	8,801,468
Program Management	131,879	103,110	60,537	16,070	4,036	0	0	10,470,612
Total	1,223,712	988,743	403,294	324,737	19,906	0	0	67,640,532

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The Savannah River Site was established by the Atomic Energy Commission in 1950 to produce nuclear materials for national defense (tritium and plutonium-239), medical, and space mission (plutonium-238) use. The Savannah River Plant produced nuclear materials by manufacturing fuel elements, irradiating target components in reactors, and chemically or thermally extracting the desired nuclear materials from the targets. In addition, the plant chemically reprocessed spent nuclear fuel to recover uranium-235.

The fuel and target manufacturing facilities and the five production reactors are not in operation at this time. The facilities used to reprocess spent nuclear materials are operated as required. Current reprocessing operations consist of providing plutonium-238 for

National Aeronautic and Space Administration missions. Otherwise, it is assumed there will be no further processing activities in the chemical separations plants.

The mission of the Savannah River Site is evolving as emphasis is shifted from nuclear material production to environmental management. The emphasis on environmental management does not preclude the Savannah River Site's remaining a major defense installation with a capability for processing and purifying tritium and plutonium separation.

In the foreseeable future, the Savannah River Site will continue to be owned by the Government and it will provide land for the Department of Energy's defense activities with adequate isolation from population centers. The central industrial area will be used by Defense Programs for continued activities and by Environmental Management for maintaining and monitoring the buried and stored waste remaining at the site. The central industrial area includes radioactive waste disposal areas restricted as long as necessary to ensure protection of human health and the environment. The goal for restoration is to have all land and ground water located near the perimeter of the Savannah River Site remediated to permit unrestricted use. In some instances, technologies may not be available to attain that goal for ground water. In those special cases, hydraulic controls will be used to prevent spreading of hazardous contaminants until effective technologies are found.

While a land-use policy has not been established to date, the site will continue to support environmental ecological research, forest management, historical programs, and archeological programs. The central industrial site area is to be used for continued Defense Programs activities and environmental management activities, such as the treatment and storage of waste and the disposal and monitoring of waste materials that remain onsite.

ENVIRONMENTAL RESTORATION

The operations at the Savannah River Site used more than 1,000 facilities potentially contaminated with hazardous and radioactive materials. The migration of contaminants from these structures through the soil has resulted in ground-water contamination. A major public-health concern is the possible offsite migration of these contaminants.

Sound remedial solutions will be developed utilizing public input and concurrence. The implementation of these solutions will be based on protecting offsite populations and onsite workers.

More than 90 areas are of concern, and are currently being characterized or remediated at the Savannah River Site. Additionally, there are approximately 400 potential areas undergoing preliminary evaluation. The waste sites already cleaned up will require long-term surveillance and monitoring.

Waste Area Group 1: Fuel and Target Fabrication

This group encompasses potential release sites resulting from fuel and target fabrication in Areas A and M and the Savannah River Technology Center. Nine release sites have been identified and found to be contaminated with volatile organic compounds (e.g., trichloroethylene and tetrachloroethylene) and metals (e.g., aluminum, zinc, arsenic, cadmium, chromium, lithium, mercury, and lead) used in developing, testing, manufacturing, and cleaning of reactor fuel and targets. Past waste discharges from these facilities resulted in soil and ground-water contamination.

Technologies assumed for cleanup include soil mixing, biological remediation through the action of microorganisms, soil washing, the injection of grout to immobilize contaminants, and excavation.

The ground water in Areas A and Area M has been contaminated, mainly with trichloroethylene and tetrachloroethylene. Remediation started in 1985, and additional ground-water cleanup units are being designed or constructed with a forecasted installation date of 1998. These operations use conventional technologies: pumping the contaminated water out at an extraction well and decontaminating it, or using an air stripper to force an air stream through the water causing any volatile organics present to evaporate. Completion of all Waste Area Group 1 activities is scheduled for 2025.

Waste Area Group 2: Central Shops Area

The Central Shops Area is located in the approximate center of the Savannah River Site; it contains machine shops, equipment repair shops, material and equipment storage

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Waste Area Group 1	12,065	11,708	6,307	5,925	5,938	2,270	0
Waste Area Group 2	2,257	3,391	709	0	0	0	0
Waste Area Group 3	9,405	20,114	26,820	10,619	6,763	819	0
Waste Area Group 4	31,475	19,180	14,618	13,456	17,990	6,828	0
Waste Area Group 5	4,810	5,481	8,012	3,293	3,301	1,356	0
Waste Area Group 6	9,291	10,796	4,784	2,590	2,600	2,602	2,596
Waste Area Group 7	1,015	1,197	24,125	919	919	919	919
Waste Area Group 8	9,023	8,459	8,459	8,982	8,982	8,982	8,982
Waste Area Group 9	8,907	0	0	72,936	172,137	334,853	522,826
Total	88,248	80,326	93,834	118,720	218,630	358,629	535,322

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Waste Area Group 1	0	0	0	0	0	0	0	233,126
Waste Area Group 2	0	0	0	0	0	0	0	34,045
Waste Area Group 3	0	0	0	0	0	0	0	382,102
Waste Area Group 4	0	0	0	0	0	0	0	549,213
Waste Area Group 5	0	0	0	0	0	0	0	136,082
Waste Area Group 6	1,044	0	0	0	0	0	0	190,803
Waste Area Group 7	10,000	25,000	33,640	0	0	0	0	494,282
Waste Area Group 8	7,133	8,982	0	0	0	0	0	398,925
Waste Area Group 9	595,749	470,173	193,171	36,602	5,872	0	0	12,075,039
Total	613,927	504,154	226,811	36,602	5,872	0	0	14,493,617

** Costs reflect a five-year averege in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

buildings, and offices. Seven potential release units are located here: seepage basins, a burning and rubble pit, a sludge lagoon, and the site of a small (0.01 acre) hydrofluoric acid spill. Contaminants include metals and organics. Radionuclides were found at two of the sites, while the sludge lagoon has organic contaminants only. Remediation technologies include soil washing, in situ vitrification, and "landfarming." Ground-water contamination has not been detected at this time. Completion of all Waste Area Group 2 activities is scheduled for 2010.

Waste Area Group 3: Reactor Units

Seventeen potential release sites are associated with the five production reactors: six at the L-Reactor, five at the K-Reactor, three at the R-reactor, two at the P-Reactor, and one at the C-Reactor. These sites include eight burning and rubble pits, five equipment maintenance areas, three seepage basins, and a sludge deposit. The major contaminants in the burning and rubble pits are arsenic, chromium, lead, and volatile organics (i.e., trichloroethylene and tetrachloroethylene). The major radionuclides are strontium-90, cesium-137, cobalt-60, and tritium. The remediation technologies for this group include thermal desorption, in situ soil vitrification, and soil mixing.

Past practices of purging contaminated reactor-basin water into unlined seepage basins, other reactor operations, and occasional accidental releases caused ground-water contamination in all five reactor areas. Each reactor ground-water area is approximately 20 acres, and the degree and type of contamination vary. Contaminants include tritium, other radionuclides, metals, and chlorinated volatile organics. The concentrations of certain radionuclides have recently exceeded the drinking water standards. Specific cleanup methods will be based on full characterization and feasibility studies. Monitoring and sampling continue, and additional monitoring wells are planned. Potential cleanup technologies include pump and treat systems with reverse osmosis, air strippers, and in situ bioremediation. Completion of all Waste Area Group 3 activities is scheduled for 2025.

Waste Area Group 4: General Separations Area

The general separations area includes two chemical reprocessing plants in the F and H Areas, burial grounds between the two areas, and high-level waste tank farms. The 11 potential release sites consist of seepage and retention basins, radioactive waste burial grounds, an abandoned underground radioactive liquid transfer line that leaked, abandoned process sewer lines, burning and rubble pits, radioactive waste solvent tanks, a low-level waste disposal facility, and one emptied high-level waste storage tank (the remainder of the high-level waste storage tanks and treatment facilities are addressed in Waste Area Group 9). It is assumed this estimate will not include any additional processing activities in the chemical separations plants.

Major contaminants are strontium-90, cesium-139, cobalt-60, and tritium; lead, arsenic, mercury, and chromium; and volatile organics. The remedial actions for this group include capping for the burial grounds and disposal facility, thermal desorption, and soil mixing.

Operation of the seepage basins resulted in contaminated ground water in the uppermost aquifer with hazardous and radioactive constituents. The major contaminants are tritium, strontium, uranium, cadmium, and lead. The removal action specified for the ground water is a pump and treat system.

Over the years, condensed cooling water from several production reactors has contaminated ground water with tritium at concentrations above drinking water standards. As there is no known technology to remediate tritium-contaminated ground water, hydraulic controls

will be employed to prevent additional migration of this contaminated plume. Completion of all Waste Area Group 4 activities is scheduled for 2025.

Waste Area Group 5: TNX and D-Area

The TNX facilities were used for experimental work and the development and demonstration of new processes. The adjacent D-Area contains the largest powerplant (coal-fired) at the Savannah River Site as well as facilities for heavy water production and purification. There are 9 potential release sites located here, ranging in size from 0.3 to 39 acre. They consist of seepage basins, ash basins, burning and rubble pits, and burial grounds. The major contaminants are arsenic, chromium, lead, and volatile organics.

The old TNX seepage basin received various chemical waste, liquid low-level radioactive waste, and leakage from process sewers and equipment maintenance. It is now contaminated with thorium, uranium, and tritium. Remedial actions are likely to include biological remediation, soil washing, and capping.

The old TNX seepage basin was the main contributor to ground-water contamination in this waste area group. Volatile organics are the most widespread contaminants, but the concentrations of nitrates, mercury, and alpha-emitting radionuclides (e.g., plutonium) also exceed the primary drinking water standard. Trichloroethylene has been detected at the seepline in the Savannah River Swamp where the ground-water plume outcrops; however, no contaminants have been detected in the Savannah River. Currently, there is no offsite risk from the ground-water contamination.

Monitoring and analysis are continuing, and a test recovery well is being installed to perform a pumping test and determine the hydraulic parameters of the aquifer. In addition to the pumping system, the recovery well has an air stripper and a recirculation well to rapidly reduce the contamination in the heart of the plume. The results of this test will be used to design and install a recovery well system. Completion of all Work Area Group 5 activities is scheduled for 2025.

Waste Area Group 6: Miscellaneous Units

The following potential release sites have been found to need remedial action: the coal-pile runoff basins in Areas A, C, D, F, H, K, and P; the acid and caustic basins in Areas F, H, K, L, P, and R; the Road A chemical basin; chemical, metal, and pesticide pits; the Burma Road site; and the sanitary landfill. These sites range in size from less than 0.1 to more then 50 acres at the sanitary landfill. The contaminants are metals at the coal pile runoff basins; the acid and caustic basins; the Road A chemical basin; and the chemical, metal, and pesticide pits. Organic chemicals are present at the Burma Road site; the sanitary landfill; and the chemical, metal, and pesticide pits.

The remediation technologies are vapor extraction (chemical, metal, and pesticide pits and the sanitary landfill); capping (the sanitary landfill); and soil washing (the Road A chemical basin and the coal-pile runoff basins). Clean fill is recommended for the acid and caustic basins.

The sanitary landfill is a trench-and-fill operation and received about 840,000 cubic yards of sanitary waste between 1974 and 1993. The ground water beneath the landfill is contaminated, mainly with organic solvents, because contaminants from the landfill have migrated downward through the soils. The selected remedy is in situ biological remediation designed to stimulate the aerobic biodegradation of the volatile organic compounds. Nutrients for the microorganisms will be introduced through wells, and air will be injected at an abundant, steady flow to cause

some of the contaminants to volatilize and move up out of the ground water into the unsaturated zone. Completion of all Waste Area Group 6 activities is scheduled for 2035.

Waste Area Group 7: Site-Evaluation Units

Of the approximately 400 potential waste sites being evaluated, as listed in Appendix G of the Federal Facility Agreement, about three-fourths are expected to require no further action. The remainder will require further investigative and remedial actions. There is little information about these sites. Thus, in order to estimate remediation costs, these sites were grouped into 13 groups. Distinct assumptions for each group, similar to the assumptions used for other sites with similar characteristics, were then developed and used to estimate costs. Completion of all Waste Area Group 7 activites is scheduled for 2045.

Waste Area Group 8: Surveillance and Maintenance

After remediation has been completed, post-closure activities such as inspections, maintenance, and monitoring are performed. In addition, the following activities are performed: investigative derived waste management is required to control potentially contaminated byproducts generated from assessment and monitoring activities; the Waste characterization/certification program will develop and implement activities to reduce waste generation and ensure compliance with waste management practices; and new technology demonstrations perform the controlled tests and pilot programs for implementing new remediation methods. Completion of all Waste Area Group 8 activities is scheduled for 2040.

Waste Area Group 9: Facility Decommissioning Activities

Surplus facilities at the Savannah River Site will require decommissioning. These facilities have been grouped into four categories based on common characteristics. In estimating costs, it was assumed that, except for the high-level waste storage tanks, most of the facilities will be available for decommissioning after 2021, and decommissioning activities will be completed by 2030. For the high-level waste tanks, decommissioning will begin in 2010 and will continue until completion in 2035. Completion of all Waste Area Group 9 activities is scheduled for 2055.

Nuclear Reactors

There are five production reactors and one research reactor at Savannah River. The production reactors (designated C, K, L, R, and P) are large concrete structures (750,000 to 1 million square feet) contaminated with radioactivity and hazardous material. All of the production reactors have been declared surplus except for the K-Reactor which is being deactivated and is expected to be declared surplus in the near future. The R-Reactor was shut down in 1964, the C-Reactor in 1985, and the P- and L-Reactors in 1990. The research reactor (Heavy Water Test Components Reactor) was shut down and deactivated in the early 1960's. It is assumed for purposes of this estimate that all reactors will be decommissioned and left in place.

Chemical Reprocessing Plants

Because of their size, high levels of contamination, and complexity, the chemical reprocessing plants, or separations facilities, present the greatest challenge for decommissioning. The major facilities in the plants are the reprocessing "canyons." These

buildings will be decontaminated, and the process equipment will be removed; however, the structures themselves will not be removed at this time. All of the support structures (i.e., powerhouse, waste handling facilities, etc.) will be removed.

Higher Risk Facilities

The higher risk facilities have a considerable amount of contamination with radioactivity and a higher priority for decommissioning. At present, none of the facilities has completed stabilization activities. In time, facilities will be added to this category.

The assumed scope of decommissioning for the higher-risk facilities is total decontamination, removal of all process equipment, removal of

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995-2000	2005	2010	2015	2020	2025	2030
Waste Area Group 1							
Assessment	6,231	4,605	4,054	4,315	4,326	1,654	0
Remedial Actions	5,833	7,103	2,253	1,610	1,612	616	0
Waste Area Group 2							
Assessment	1,598	826	0	0	0	0	0
Remedial Actions	659	2,565	709	0	0	0	0
Waste Area Group 3							
Assessment	5,363	2,356	1,374	0	0	0	0
Remedial Actions	4,042	17,758	25,445	10,619	6,763	819	0
Surveillance And Maintenance	0	0	0	0	0	0	0
Waste Area Group 4							
Assessment	11,638	1,635	1,040	1,228	1,119	1,103	0
Remedial Actions	19,837	17,545	13,578	12,228	16,872	5,725	0
Surveillance And Maintenance	0	0	0	0	0	0	0
Waste Area Group 5							
Assessment	1,296	103	0	0	0	0	0
Remedial Actions	3,514	5,378	8,012	3,293	3,301	1,356	0
Waste Area Group 6							
Assessment	5,904	1,086	71	0	0	0	0
Remedial Actions	3,387	9,710	4,713	2,590	2,600	2,602	2,596
Surveillance And Maintenance	0	0	0	0	0	0	0
Waste Area Group 7							
Assessment	1,015	261	5,307	202	202	202	202
Remedial Actions	0	936	18,819	717	717	717	717
Waste Area Group 8							
Long Term Surveillance And Monitoring	9,023	8,459	8,459	8,982	8,982	8,982	8,982
Waste Area Group 9							
Assessment	8,907	0	0	0	0	0	0
Facility Decommissioning	0	0	0	72,936	172,137	334,853	522,826
Total	88,248	80,326	93,834	118,720	218,630	358,629	535,322

Environmental Restoration Activity Costs (cont'd)

	*Five-Year Averages (Thousands of Constant 1995 Dollars)**							
	2035	2040	2045	2050	2055	2060	2065	Life Cycle
Waste Area Group 1								
Assessment	0	0	0	0	0	0	0	132,155
Remedial Actions	0	0	0	0	0	0	0	100,971
Waste Area Group 2								
Assessment	0	0	0	0	0	0	0	13,718
Remedial Actions	0	0	0	0	0	0	0	20,327
Waste Area Group 3								
Assessment	0	0	0	0	0	0	0	50,832
Remedial Actions	0	0	0	0	0	0	0	331,268
Surveillance And Maintenance	0	0	0	0	0	0	0	2
Waste Area Group 4								
Assessment	0	0	0	0	0	0	0	100,453
Remedial Actions	0	0	0	0	0	0	0	448,758
Surveillance And Maintenance	0	0	0	0	0	0	0	2
Waste Area Group 5								
Assessment	0	0	0	0	0	0	0	8,295
Remedial Actions	0	0	0	0	0	0	0	127,788
Waste Area Group 6								
Assessment	0	0	0	0	0	0	0	41,211
Remedial Actions	1,044	0	0	0	0	0	0	149,591
Surveillance And Maintenance	0	0	0	0	0	0	0	2
Waste Area Group 7								
Assessment	2,200	5,500	7,401	0	0	0	0	113,475
Remedial Actions	7,800	19,500	26,239	0	0	0	0	380,807
Waste Area Group 8								
Long Term Surveillance And Monitoring	7,133	8,982	0	0	0	0	0	398,925
Waste Area Group 9								
Assessment	0	0	0	0	0	0	0	53,444
Facility Decommissioning	595,749	470,173	193,171	36,602	5,872	0	0	12,021,595
Total	613,927	504,154	226,811	36,602	5,872	0	0	14,493,617

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

structures to grade level, and restoration of the site. At some time in the future, the ground areas may be released for completely unrestricted use.

Surplus Noncontaminated Facilities

The surplus noncontaminated facilities in the decommissioning program are the support facilities (i.e., administrative buildings) that have been, or will be, surplus property as the Savannah River Site continues to reduce its production mission. These facilities have no chemical or radionuclide contamination, nor will they contain hazardous waste. They will be dismantled to grade level, and the foundations will be removed. At completion, their respective sites will be available for unrestricted use.

Major Waste Management Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	1995-2000	2005	2010	2015	2020	2025	2030
CIF	14,333	19,880	19,880	19,880	19,880	19,880	19,880
Defense Waste Processing	154,417	138,400	137,800	138,000	137,600	59,400	0
F/H Area Tank Farms Operations	88,883	105,000	104,800	101,000	89,000	3,660	0
Glass Water Storage Building	0	12,780	8,160	0	0	0	0
Hazardous Waste and LLMW Vaults	23,667	77,600	58,800	52,200	52,200	52,200	52,200
HLW Removal Project	32,450	40,400	40,400	3,880	0	0	0
ITP	54,233	50,600	56,000	55,000	53,000	2,440	0
ITP/OWPF Benzine Abatement	2,467	0	0	0	0	0	0
M Area Waste Treatment	6,883	640	680	700	700	180	0
Saltstone	11,433	11,360	12,920	12,920	12,860	620	0
Saltstone Vaults HLW Disposal	6,383	6,460	5,580	6,340	3,440	0	0
Tank Farm Upgrades	8,717	13,880	12,240	5,400	0	0	0
TRU Facility	0	2,200	5,800	6,540	6,560	6,560	6,540
TRU Waste Retrieval	317	0	0	0	0	0	0

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
CIF	19,880	19,880	19,880	0	0	0	0	980,600
Defense Waste Processing	0	0	0	0	0	0	0	3,982,500
F/H Area Tank Farms Operations	0	0	0	0	0	0	0	2,550,600
Glass Water Storage Building	0	0	0	0	0	0	0	104,700
Hazardous Waste and LLMW Vaults	52,200	52,200	52,200	250,200	0	0	0	3,903,000
HLW Removal Project	0	0	0	0	0	0	0	618,100
ITP	0	0	0	0	0	0	0	1,410,600
ITP/DWPF Benzine Abaitment	0	0	0	0	0	0	0	14,800
M Area Waste Treatment	0	0	0	0	0	0	0	55,800
Saltstone	0	0	0	0	0	0	0	322,000
Saltstone Vaults HLW Disposal	0	0	0	0	0	0	0	147,400
Tank Farm Upgrades	0	0	0	0	0	0	0	209,900
TRU Facility	8,740	7,020	6,540	0	0	0	0	282,500
TRU Waste Retrieval	0	0	0	0	0	0	0	1,902

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Note: These projects represent a subset of waste management activities. Associated program management costs are built-in to the estimates provided.

Costs of Environmental Restoration

Tables showing the estimated cost of environmental restoration and a more detailed tabulation by activity are given at the end of this summary.

WASTE MANAGEMENT

The Savannah River Site has extensive facilities for the treatment, storage, and disposal of radioactive and other wastes. The existing facilities will need upgrading, and several new facilities are scheduled to come on line after the year 2000.

In estimating costs, it was assumed, except for the high-level waste storage tanks, most of the facilities will be available for decommissioning after 2021. The last high-level waste tanks will be available for decommissioning in 2035.

Waste Treatment

The Savannah River Plant provides onsite treatment for high-level radioactive waste, low-level radioactive waste, low-level mixed waste, and hazardous chemical waste. The various types of waste are defined in the introduction to this volume.

High-Level Waste

Salt solution removed from the high-level waste storage tanks is chemically treated in the In-Tank Precipitation Facility to precipitate radionuclides. The decontaminated filtrate is stripped of benzene and transferred to the Saltstone Facility for disposal. The concentrated precipitate is stored in a precipitate feed tank and later transferred to the Late Wash Facility for treatment to remove nitrites.

The sludge from the high-level waste storage tanks is transferred to a tank at the Extended Sludge Processing Facility, where it is washed in water and sodium hydroxide to remove salts and aluminum. The washed sludge is stored in a tank until transfer to the Defense Waste Processing Facility.

At the Defense Waste Processing Facility, the washed sludge and the precipitate from the In-Tank Precipitation Facility are combined with glass frit to form glass logs. This facility uses complex chemical processes to prepare the precipitate and sludge for mixing and eventual vitrification in the glass melter. It also removes organics from the precipitate and removes and recovers mercury from the precipitate and sludge. The vitrification process permanently immobilizes the high-level waste by producing glass logs solidified in stainless-steel canisters. The canisters are temporarily installed in the Glass Waste Storage Facility until a permanent repository is available. All of the existing high-level waste will be vitrified by 2021.

The decontaminated filtrate from the In-Tank Precipitation Facility is processed in the Saltstone Facility, where it is blended with cement, flyash, and blast-furnace slag to form grout. The grout is pumped into disposal vaults where it hardens into solid nonhazardous waste for permanent isolation.

Low-Level Waste

At present, solid low-level radioactive waste is placed in rigid metal containers and disposed in low activity disposal vaults or shallow land

burial. In 1996, incineration will start in the Consolidated Incineration Facility to incinerate approximately 25 percent of the low-level waste for volume reduction, based on the record of decision for the Waste Management Environmental Impact Statement. Another new treatment plant will be the Size-Reduction Facility to reduce the size of large pieces of equipment (i.e., reprocessing vessels, pumps, and agitators) for more cost-effective disposal.

Three new treatment plants are scheduled to come on line in 2006. One is the Super Compactor, which will have a 10:1 compaction ratio to reduce the volume of the waste. Another is the Soil-Sort Facility to be used to isolate and remove small particles of radioactive material dispersed throughout soil. Both contaminants and clean soil are assayed continuously during processing to document the level of radioactivity and to determine whether the clean soil meets release criteria. The third is the Non-Alpha Vitrification Facility to be used to process low-level, mixed, and hazardous chemical wastes. The treatment will consist of several processes to prepare waste for vitrification, vitrify the waste, and treat the gases and liquids generated in vitrification.

Mixed Waste

At present, mixed waste is not treated at the Savannah River Site. In 1996, however, vitrification of mixed-waste sludge from the M-Area will start. In 1996, the Consolidated Incineration Facility will Start processing mixed waste. This incinerator is expected to process the entire inventory of burnable mixed and hazardous chemical waste within 3 to 4 years of startup. After 2006, the mixed waste to be incinerated will be pretreated in the containment building that will have five separate bays for processing low-level, mixed, and hazardous chemical waste; container opening and sorting; size reduction; decontamination; and macroencapsulation and repackaging characterization. Waste will be processed through each bay, as necessary, to properly handle each waste container.

Hazardous Chemical Waste

At present, the only offsite treatment at approved commercial facilities is available for hazardous chemical waste. However, measures are being implemented to reduce the hazardous waste inventory by 90 percent. In 1996, most of the hazardous waste (approximately 90 percent of the total inventory) will commence treatment in the consolidated incinerator.

Transuranic Waste

There are no treatment facilities for transuranic waste at the Savannah River Site. Treatment for some transuranic waste, however, will be required for acceptance at the Waste IsolationPilot Plant. For this reason, a new treatment facility will be developed, called the Transuranic Waste Certification, Characterization and Alpha Vitrification Facility. The Alpha Vitrification Facility will be used only for plutonium-238 waste, which has high heat output, and will not meet expected waste acceptance criteria for Waste Isolation Pilot Plant.

The certification and characterization facility will provide the capability to segregate low-level waste and low-level mixed waste from transuranic waste. The latter is distinguished by the concentration (100 or more nanocuries per gram of waste) of plutonium and other alpha-emitting long-lived transuranics. It will open and inspect transuranic waste containers and examine, sort, characterize, assay, and repackage their contents to meet the Waste Isolation Pilot Plant waste acceptance criteria. Several options for this facility are being considered: converting and using existing

facilities (e.g., the P-Reactor and the Naval Fuels Facility), using privatized and commercial ventures, or building a new plant. Completion is scheduled for 2007.

After characterization and certification, transuranic waste will be shipped to the Alpha Vitrification Facility, where it will be mixed with frit and additives and then vitrified. The vitrified waste will be returned to the certification facility for final certification and then shipped to the Waste Isolation Pilot Plant for disposal. The Alpha Vitrification Facility is scheduled to come on line in 2008. Waste found to have transuranic concentrations of less than 100 nanocuries per gram of waste will be certified to be plutonium-contaminated, or long-lived, low-level waste. This waste is not considered transuranic waste and will not be accepted at the Waste Isolation Pilot Plant. It will be kept in storage vaults until its disposition is decided.

High-Level Waste

The decontaminated waste will be processed through each bay as necessary to properly handle each waste container.

Waste Storage

The Savannah River Site provides storage facilities for all radioactive and other hazardous wastes as well as spent nuclear fuel.

High-Level Waste

The tank farms in the F- and H-Areas consist of 51 high-level-waste storage tanks, although 7 of these tanks are used in waste treatment. The tanks range in capacity from 750,000 to 1.3 million gallons. Twenty-four of the tanks have single walls, and 27 tanks have double walls. Underground transfer piping, valve stations and transfer equipment, cooling and ventilation systems, and monitoring systems are installed on all tanks. Since the 1950's, the tanks have received high-level waste from the chemical reprocessing plants as well as several miscellaneous small waste streams from other facilities.

The waste management program at the Savannah River Site is currently installing mixing and transfer pumps on 47 of the tanks to allow slurrying and waste transfer to the In-Tank Precipitation and Extended Sludge Processing facilities for treatment. In addition, upgrades of the tank farms (e.g., providing air sampling for monitoring) are planned or under way to correct deficiencies and bring operations into compliance.

Before being pumped into the tanks, high-level waste is sent to one of two active evaporators for volume reduction (two other evaporators have been shut down) and then stored in the water-cooled storage tanks. A large evaporator, with twice the capacity of existing evaporators, is under construction and is scheduled to be completed in 1997 and operating around 2000. One tank has been completely emptied, and single-walled tanks no longer receive high-level waste.

Transfers of high-level waste are directed to appropriate tanks through diversion boxes and pump pits, which are concrete underground structures housing valves, small transfer tanks, and pumps. A containment building is being installed over the diversion box in the H-Area. It will allow access to the equipment in bad weather and reduce the radiation exposures received by workers. In addition, one of the old diversion boxes is being replaced with one of current design; known as the New Waste-Transfer Facility, it will have an enclosure building with a remotely operated crane and a control room.

Storage will also be provided for high-level waste vitrified in the Defense Waste Processing Facility. The Glass-Waste Storage Building will have sufficient capacity to provide up to 10 years of interim storage for vitrified-waste canisters until a permanent repository is available.

However, the current repository schedule shows disposal starting in 2016 requiring additional storage capacity at the Savannah River Site. This storage has been added for the purpose of this estimate.

Low-Level Waste

No separate storage facilities are provided for routine low-level waste because this waste is placed in burial grounds or disposal vaults at the Savannah River Site after treatment and packaging. However, no disposal site is available at present for plutonium-contaminated, or long-lived, low-level waste. This waste will be stored in the Long-Lived-Waste Storage Building until treatment or disposal technologies are developed for this waste.

Hazardous Chemical Waste

Hazardous chemical waste is stored in three buildings and on outside asphalt pads. Building 710-B in the B-Area is an enclosed building with an actual usable capacity of approximately 145 cubic meters. Building 645-N in the N-Area is a partially enclosed metal building with a slab on-grade concrete floor subdivided into cells to be used to store separate classes of hazardous chemical waste in drums. Its actual usable capacity is about 170 cubic meters. Building 645-4N is an enclosed metal building with a single-slab concrete pad floor and an actual usable capacity of 425 cubic meters. This building is limited to toxic waste with no ignitable or corrosive materials allowed.

Outside storage pads are available on the asphalt paving adjacent to storage buildings 645-N and 645-4N. No liquids are allowed, and the actual usable capacity is about 1,800 cubic meters. With the Consolidated Incineration Facility scheduled to start up in 1996, the total storage capacity is sufficient to accommodate the hazardous chemical waste generated at the Savannah River Site until the year 2002, when the waste will be managed in the disposal vaults to be constructed for hazardous and mixed wastes.

Mixed Waste

At present, storage for mixed waste is provided in four buildings. Building 645-2N is an enclosed metal building containing 6 cells with concrete floors; its actual usable capacity is approximately 560 cubic meters. Building 316-M is an enclosed metal building with a concrete pad floor and an actual storage capacity of about 120 cubic meters. Buildings 643-29E and 643-43E are partially enclosed metal structures with concrete pad floors and storage capacities of approximately 120 and 620 cubic meters, respectively. Outside storage for mixed waste is available at Transuranic Pads 6 through 13, with most of the waste currently stored at Pad 9.

Additional storage capacity, due to start operating in 1996, is needed to accommodate stabilized sludge in the M-Area and to provide dedicated storage for the stabilized ash and blowdown, a mixed waste, from the incinerator. At design discharge rates, the incinerator will run out of storage capacity in 2.5 to 3 years, or by the year 1999. An existing pad in the M-Area is available and appropriate for this function.

Storage for liquid mixed waste presents different requirements. About 30,000 gallons of solvent from the PUREX chemical separation process is currently stored in 2 storage tanks. Both tanks must pass annual integrity tests to remain in service, and they can remain in service for a maximum of 15 years. This 15-year period will end in October 1996. The two tanks will remain in service until four new solvent tanks are constructed and placed in service in October 1996. The new tanks will be

30,000-gallon double-walled underground storage tanks with features like cathodic protection, leak detection and collection, and sampling ports.

Transuranic Waste

Transuranic and mixed transuranic wastes are stored in 55-gallon steel drums, concrete culverts, concrete casks, and carbon-steel boxes. Transuranic waste generated since 1974 is stored on 17 storage pads in the Solid-Waste Management Facility. Six of these pads are "mounded" (wholly or partly buried), and four are covered for protection from weather. Two additional pads are permitted to accept only nonmixed transuranic waste, but the storage permit will be revised to allow mixed transuranic waste on the pads. The drums in the five wholly mounded pads will be retrieved and overpacked because they are beginning to exceed their 20-year design life. Retrieval operations will begin in 1996.

The preferred storage strategy for transuranic waste at the Savannah River Site is to use surplus-reactor buildings to provide better protection. The current plan is to modify the R-Reactor for the storage of non-mixed transuranic waste and to modify the P-Reactor for mixed transuranic waste (mostly drums from the pads and the retrieval operation). Using the reactors for other, higher-priority programs, however, may preempt their use for the storage of transuranic waste. If the reactors are not available, a storage area equivalent to eight existing storage pads will be built in the Solid-Waste Management Facility.

Spent Nuclear Fuel

Existing spent nuclear at the Savannah River Site is currently stored underwater. The strategy for future storage of spent nuclear fuel is to develop dry aboveground storage. To accommodate the dry-storage option, the Savannah River Site will keep spent fuel in wet storage while technology is developed and dry-storage facilities are constructed. All of the spent fuel will be eventually disposed in a geologic repository. Until that time, the Savannah River Site will provide safe, monitored storage facilities from which the fuel can be readily retrieved, when necessary.

Waste Disposal

High-Level Waste

No permanent disposal for high-level waste will be provided at the Savannah River Site. High-level waste will be vitrified and shipped to a geologic repository (assumed to be at Yucca Mountain in Nevada for the purposes of this report) for permanent disposal. This repository is currently scheduled to open in 2010.

Low-Level Waste

Low-level waste is disposed by burial in trenches or emplacement in vaults, depending partly on the characteristics of the waste. To date, most low-level waste has been buried in engineered trenches several acres in size and approximately 20 feet deep. Once filled, the trench is backfilled, often with suspect soils showing no detectable contamination.

Another option for low-level waste is material management in a low-activity-waste vault, a subgrade concrete vault divided into 12 cells and has a capacity of 34,000 cubic meters. This vault, which is part of the Solid-Waste Management Facility, is expected to be filled up in about 4 years. However, if the consolidated incinerator is allowed to burn some of the low-level waste for volume reduction, the life of the vault will be extended 6.6 years, to the year 2001. The first set of these vaults is in operation.

Separate facilities are provided for intermediate-level waste, that is, waste whose radioactivity is greater than that of low-level waste. These facilities consist of trenches, usually 20 feet deep and 10 feet wide, and

underground concrete vaults. For intermediate-level waste without tritium, the vault has seven cells each with a capacity of 904 cubic meters. At projected generation rates, this vault will fill up in 6.5 years. For intermediate-level tritium waste, the vault has only two cells and a total capacity of about 1,800 cubic meters. It is adjacent to the vault for non-tritium waste. At projected generation rates, this vault will fill up in 7.3 years.

Disposal in aboveground vaults will also be provided for plutonium-contaminated low-level waste, that is, waste certified to be contaminated with transuranic radionuclides at concentrations below 100 nanocuries per gram of waste. (This waste is also called "long-lived, low-level waste" and "alpha low-level waste.") Plutonium-contaminated waste without hazardous chemicals will be disposed in the low-activity waste vault inside the Solid-Waste Management Facility. The first set of low-activity waste vaults is in operation.

Mixed plutonium-contaminated waste will also be sent to the Solid-Waste Management Facility, where it will be emplaced in vaults constructed especially for hazardous and mixed waste.

Each vault will have individual waste cells with temporary removable covers. Each cell will have a mobile gantry crane for waste emplacement and for handling the temporary covers. Each cell will also be protected with a system to detect and collect any leachate accumulating in the cell. The first set of vaults for hazardous and mixed wastes will be completed in 2002.

Hazardous Chemical and Mixed Wastes

As already mentioned, the inventory of hazardous waste at Savannah River is expected to be reduced by 90 percent. In 1996, most of the hazardous waste will begin being treated in the consolidated incinerator. The remaining waste will be emplaced in the above-described vaults for hazardous and mixed wastes. These vaults will also accept the flyash and blowdown from the incinerator classified as mixed waste. As stated above, the first set of these vaults will be completed in 2002.

Transuranic Waste

Transuranic and mixed transuranic waste will be shipped to the Waste Isolation Pilot Plant in New Mexico for disposal. Shipments are expected to begin in 1998.

Nuclear Material and Facility Stabilization Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	324,209	232,978	364,772	18,669	12,556	27,886	287	5,230,981

* Costs reflect e five-year averege in constant 1995 dollars, except in FY 1995-2000, which is e six-year average.

** Total Life Cycle is the sum of ennuel costs in constant 1995 dollars.

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
High-Level Waste	163,048	215,186	253,977	293,436	335,905	17,222	0
Transuranic Waste	0	22,309	20,495	9,372	9,372	9,372	9,372
Low-Level Mixed Waste	17,178	23,735	23,219	23,179	23,179	23,179	23,179
Low-Level Waste	13,946	21,047	20,260	20,168	20,168	20,168	20,168
Storage and Handling							
High-Level Waste	113,701	189,103	210,338	166,197	152,486	7,022	0
Spent Nuclear Fuel	30,813	79,587	115,870	106,339	103,330	139,278	101,490
Transuranic Waste	7,318	9,011	6,894	6,764	6,256	6,305	6,477
Low-Level Mixed Waste	2,977	3,857	3,857	3,857	3,857	4,235	5,741
Low-Level Waste	944	920	1,415	1,132	1,132	2,263	6,221
Disposal							
High-Level Waste	0	0	0	0	0	150,480	150,480
Spent Nuclear Fuel	0	0	0	0	0	0	26,919
Low-Level Mixed Waste	33,234	100,429	85,482	79,352	79,322	78,757	74,385
Low-Level Waste	18,802	30,475	34,786	34,798	34,725	34,715	34,533
Hazardous Waste	10,224	12,432	14,131	11,550	11,561	11,631	11,539
Sanitary Waste	2,188	3,182	2,680	2,680	2,680	2,680	2,680
Other							
Decommissioning	455	2,174	25,080	24,257	35,614	43,233	76,912
Waste Management TSD	12,962	15,884	15,884	15,884	15,884	15,884	15,884
Inter-Site Disposal Assessment							
Low-Level Waste	0	-66	0	0	0	0	0
Total	427,789	729,264	834,366	798,964	835,469	566,422	565,979

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
High-Level Waste	0	0	0	0	0	0	0	6,556,914
Transuranic Waste	9,372	7,501	3,069	378	0	0	0	503,047
Low-Level Mixed Waste	23,179	23,179	6,263	0	0	0	0	1,064,511
Low-Level Waste	20,168	20,168	4,232	0	0	0	0	916,399
Storage and Handling								
High-Level Waste	0	0	0	0	0	0	0	4,307,940
Spent Nuclear Fuel	65,542	0	0	0	0	0	0	3,742,058
Transuranic Waste	6,564	6,306	1,885	139	0	0	0	326,916
Low-Level Mixed Waste	5,832	5,688	3,148	1,874	0	0	0	227,576
Low-Level Waste	3,959	4,379	4,856	35	0	0	0	137,223
Disposal								
High-Level Waste	0	0	0	0	0	0	0	1,504,800
Spent Nuclear Fuel	26,752	0	0	0	0	0	0	268,356
Low-Level Mixed Waste	66,393	68,372	68,198	265,213	9,998	0	0	5,078,909
Low Level Waste	33,828	32,745	23,815	4,330	0	0	0	1,606,564
Hazardous Waste	11,537	11,537	480	96	0	0	0	543,806
Sanitary Waste	2,680	2,680	0	0	0	0	0	122,842
Other								
Decommissioning	0	0	0	0	0	0	0	1,039,076
Waste Management TSD	15,884	12,707	0	0	0	0	0	697,248
Inter-Site Disposal Assessment								
Low-Level Waste	0	0	0	0	0	0	0	-331
Total	291,689	195,262	115,946	272,065	9,998	0	0	28,643,853

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Spent Nuclear Fuel

All of the spent fuel will be eventually shipped to a geologic repository for disposal.

Sanitary Waste

Until November 1994, most sanitary waste was disposed at the interim sanitary landfill to dispose of material from offices and construction. In November 1994, a commercial company started disposing sanitary waste at an offsite facility. Offices not located at the Savannah River Site use a commercial landfill. Demolition and construction debris is used at the site for erosion control and backfill where possible; the remainder is hauled to the Burma Road landfill.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

When a facility is transferred from Defense Programs to Environmental Management, it undergoes a process of stabilization in which nuclear materials are stabilized (if necessary), the facility is shut down, radioactive and hazardous materials are removed, and other actions are taken as necessary to mitigate an immediate threat to health and safety. Once this is accomplished, the facility is maintained and monitored as appropriate pending further action, which is usually decommissioning.

Nuclear material and facility stabilization at the Savannah River Site began in 1995. Of the 1,382 facilities scheduled to undergo this process, 1,260 have already begun stabilization activities. They include storage facilities for hazardous materials and chemicals, wastewater treatment plants, a metallurgy laboratory, two chemical processing canyons, and plutonium-storage facilities. It is assumed the remaining 122 facilities will incrementally begin stabilization in 1996. They include six reactors, a plant for producing heavy water, and storage

Landlord Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Directly Appropriated Landlord	225,465	186,217	186,217	186,217	186,217	186,217	186,217

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Directly Appropriated Landlord	186,217	186,217	0	0	0	0	0	8,801,468

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

for radioactive materials. The wastes resulting from the stabilization process will include high-level, transuranic, low-level, mixed low-level, and hazardous chemical wastes. This report assumes stabilization and maintenance at the Savannah River Site will be completed by the year 2030.

LANDLORD FUNCTIONS

Landlord functions at the Savannah River Site recently transferred to the Environmental Management program. Environmental Management's landlord functions are directed at providing a safe workplace and the infrastructure needed to support all site programs. This includes the maintenance of buildings, the maintenance of heating and air-conditioning equipment, groundskeeping, roadway upkeep, the maintenance of electrical distribution systems and other utilities, safeguards and security, radiation protection, transportation and hauling services, real-property management, and emergency preparedness.

PROGRAM MANAGEMENT

Program management consists of a wide variety of activities cutting across all aspects of environmental management and are not intended to directly support specific projects or operations at the Savannah River Site. Most of these activities are general program management tasks, applicable to any major program at DOE, while others are specific to environmental management activities.

Prominent categories of activities in general program management are area support programs, regulatory support, operations integration, program integration, and program controls and analysis. Area support includes environmental, safety, and health programs; quality assurance; training; emergency management; fire protection; centralized engineering and maintenance; safeguards; and security. Specific environmental support includes providing financial assistance to Georgia and South Carolina in supporting emergency preparedness, and to South Carolina for oversight of Savannah River Site environmental activities.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	118,317	270,267	310,761	323,433	354,615	204,304	173,130	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Program Management	131,879	103,110	60,537	16,070	4,036	0	0	10,470,612

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

The various tasks of regulatory support include regulatory oversight and programmatic guidance; implementation and monitoring of compliance with pertinent environmental regulations and laws; and coordination of external surveillance, audits, and appraisals.

Operations integration involves developing, implementing, and conducting training programs; establishing and maintaining performance expectations and measurements; and preparing, reviewing, implementing, and maintaining procedures. Program integration, on the other hand, requires the development of near- and long-term plans for all remedial actions and waste streams. Near-term integration tasks include the coordination of private-sector initiatives and the implementation of interim storage strategies for different waste types.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	88,248	80,326	93,834	118,720	218,630	358,629	535,322
Waste Management	427,789	729,264	834,366	798,964	835,469	566,422	565,979
Nuclear Material and Facility Stabilization	324,209	232,978	358,289	7,487	12,546	27,604	5
Directly Appropriated Landlord	225,465	186,217	186,217	186,217	186,217	186,217	186,217
Program Management	118,317	270,267	310,761	323,433	354,615	204,304	173,130
Total	1,184,027	1,499,052	1,783,466	1,434,820	1,607,477	1,343,175	1,460,653

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	613,927	504,154	226,811	36,602	5,872	0	0	14,493,617
Waste Management	291,689	195,262	115,946	272,065	9,998	0	0	28,643,853
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	5,139,795
Directly Appropriated Landlord	186,217	186,217	0	0	0	0	0	8,801,468
Program Management	131,879	103,110	60,537	16,070	4,036	0	0	10,470,612
Total	1,223,712	988,743	403,294	324,737	19,906	0	0	67,549,346

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	0	0	6,483	11,182	9	281	281	91,181

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Waste Area Group (WAG)-1 Projects	2025
	WAG-1 Assessment	2025
	WAG-1 Remediation	2025
	WAG-2 Projects	2010
	WAG-2 Assessment	2005
	WAG-2 Remediation	2010
	WAG-3 Projects	2025
	WAG-3 Assessment	2010
	WAG-3 Remediation	2025
	WAG-4 Projects	2025
	WAG-5 Projects	2025
	WAG-5 Assessment	2005
	WAG-5 Remediation	2025
	WAG-6 Projects	2035
	WAG-6 Assessment	2010
	WAG-6 Remediation	2035
	Remediation of Sanitary Landfill	2035
	WAG-7 Projects	2045
	WAG-7 Assessment	2045
	WAG-7 Remediation	2045
	WAG-8 Projects	2055
	WAG-9 Projects	2000
	WAG-9 Assessment	2000

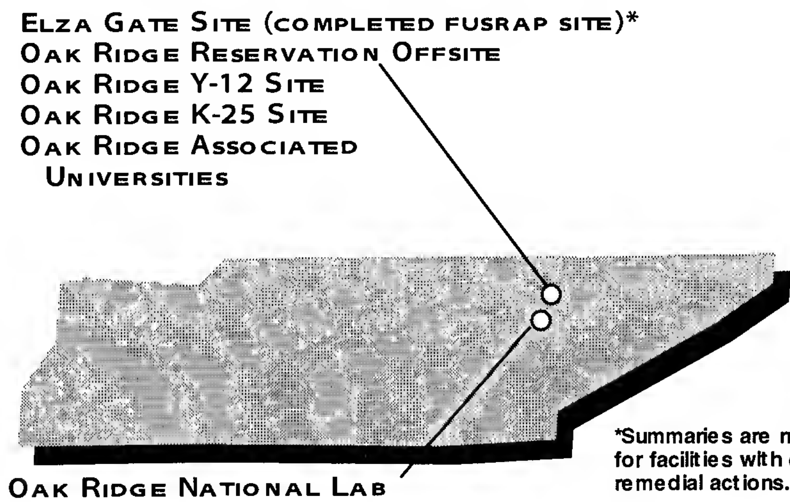
Major Activity Milestones (cont'd)

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration (cont'd)		Fiscal Year
	All Other Environmental Restoration Activities	2055
	Other ER Assessment Activities	2025
	Other ER Decommissioning Activities	2055
	Other ER Long-Term Surveillance & Maintenance Activities	2040
	Other ER Remediation Activities	2025
Waste Management (by facility/activity)		Fiscal Year
	Consolidated Incineration Facility Activities	2045
	Defense Waste Processing Facility (DWPF) Activities	2025
	F/H Area Tank Farm Operations	2025
	Glass Waste Storage Building Activities	2010
	Hazardous Waste & Low-Level Mixed Waste (LLMW) Vaults Activities	2065
	High-Level Waste (HLW) Decontamination & Decommissioning Activities	2030
	HLW Removal Project	2015
	In-Tank Precipitation Facility (ITP) Activities	2025
	ITP/DWPF Benzene Abatement	2000
	Low-Level Waste (LLW) Disposal	2050
	M Area Waste Treatment Activities	2025
	Mixed Waste (MW) Treatment Activities	2045
	Activities at Saltstone Facility	2025
	Saltstone Vaults HLW Vaults Activities	2020
	Spent Nuclear Fuel Activities	2025
	Tank Farm Upgrades	2025
	Transuranic Waste (TRU) Facilities	2045
	TRU Waste Retrieval Activities	1997
	All Other WM Project Activities	2055
	All Other WM Operations	2055

Major Activity Milestones (cont'd)

ACTIVITY	TASK	COMPLETION DATE
Nuclear Material and Facility Stabilization Projects		Fiscal Year
	NM&FS Activities	2030

For further information on this site, please contact: *Public Participation Office* *(803) 725-5752*
Public Affairs Office *(803) 725-2889*
Technical Liaison: Shayne Farrell (803) 725-5921



*Summaries are not provided for facilities with completed remedial actions.

TENNESSEE

Estimated State Total

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Oak Ridge Associated Universities	1,000	400	1,100	1,400	3,800	4,400
Oak Ridge K-25 Site	254,000	240,400	337,500	396,500	391,400	400,800
Oak Ridge National Laboratory	200,00	159,700	217,800	220,300	254,200	289,300
Oak Ridge Reservation Offsite	15,700	14,400	21,300	18,200	38,200	29,500
Oak Ridge Y-12 Plant	77,250	119,000	148,800	160,700	230,160	233,660
Total	547,950	533,900	726,500	797,100	917,760	957,660

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 raflect Budget Shortfall Scenario, costs for shaded araa assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Oak Ridge Associated Universities	1,533	874	790	390	342	46	4
Oak Ridge K-25 Site	336,193	276,696	312,872	312,681	364,164	489,927	488,750
Oak Ridge National Laboratory	217,335	387,062	359,565	360,547	305,471	232,141	172,172
Oak Ridge Reservation Offsite	20,067	11,860	8,583	8,373	5,610	740	710
Oak Ridge Y-12 Plant	141,179	179,345	179,258	143,451	108,025	169,752	104,418
Total	716,306	855,837	861,067	825,441	783,612	892,606	766,054

	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Oak Ridge Associated Universities	0	0	0	0	0	0	0	21,425
Oak Ridge K-25 Site	424,765	330,898	276,099	205,146	209,267	530	46	20,476,360
Oak Ridge National Laboratory	116,918	73,026	15,951	123	10	5	1	11,418,969
Oak Ridge Reservation Offsite	552	440	0	0	0	0	0	373,873
Oak Ridge Y-12 Plant	72,105	51,184	3,917	19,459	18,620	254	21	6,098,658
Total	614,340	455,548	295,966	224,729	227,898	789	68	38,389,285

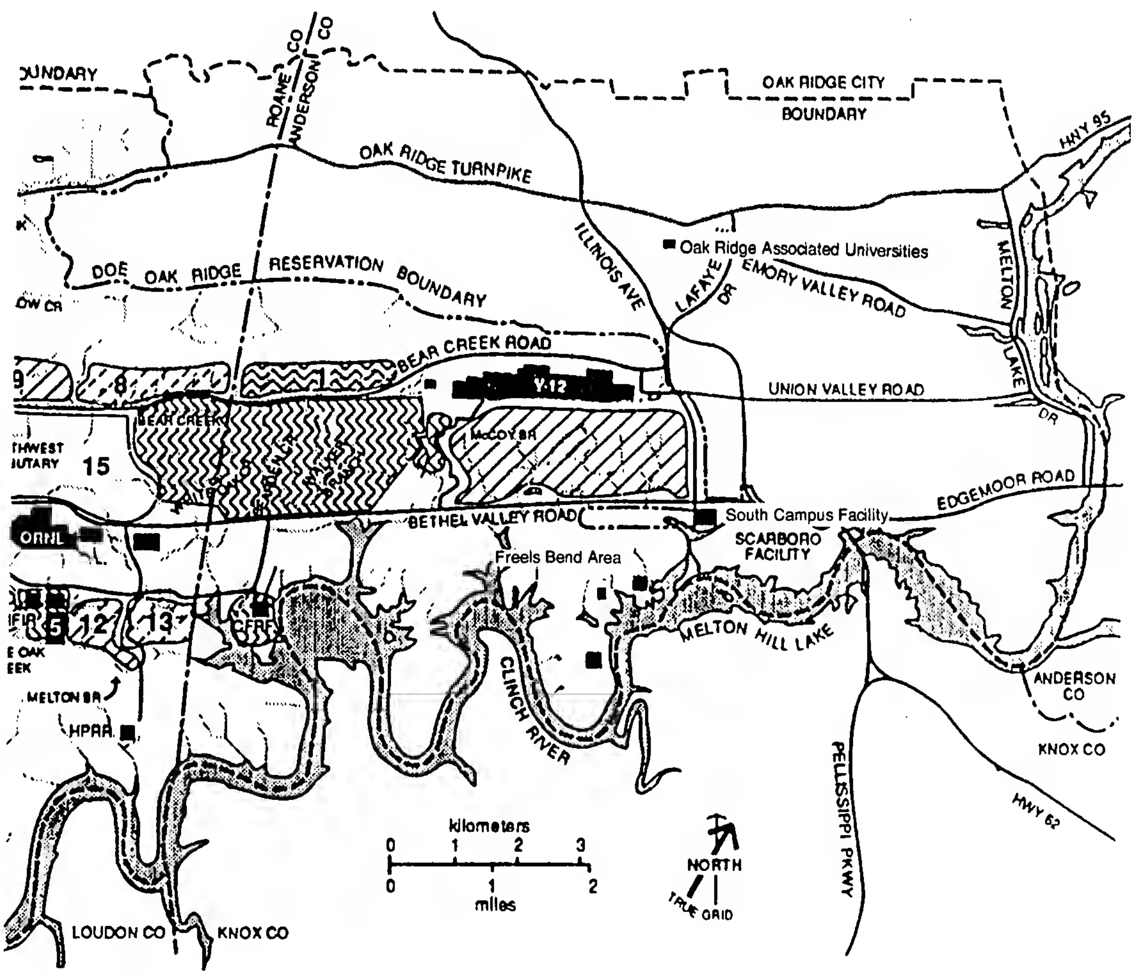
** Costs reflect a five-year everage in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

THE OAK RIDGE ASSOCIATED UNIVERSITIES PROGRAM AND THE OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

The South Campus Facility, one of three research facilities discussed in this report, is located in Oak Ridge, Tennessee. It was established in 1945 and is operated by the Oak Ridge Associated Universities. The Freels Bend Area hosts facilities supporting research conducted at the South Campus Facility. This area is southwest of the South Campus and is bounded on three sides by the Clinch River.

The Scarboro Operations Site of the Oak Ridge Institute for Science and Education was one of several Government-owned facilities assigned to Oak Ridge Associated Universities and the Oak Ridge Institute for Science and Education in 1981. At present, the site consists of 25 buildings and 3 concrete pads on 164 acres within the Oak Ridge Reservation.



Estimated Site Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	900	0	500	800	2,800	3,500
Nuclear Material and Facility Stabilization	0	400	400	400	400	400
Program Management	100	0	200	200	600	500
Total	1,000	400	1,100	1,400	3,800	4,400

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	1,268	155	76	5	283	46	4	10,460
Nuclear Material and Facility Stabilization	127	401	394	32	0	0	0	4,898
Program Management	137	318	320	353	58	0	0	6,067
Total	1,533	874	790	390	342	46	4	21,425

** *Costs reflect e five-year everage in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constent 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

Established in 1946, Oak Ridge Associated Universities is a private not-for-profit consortium of 82 colleges and universities. Its mission is to provide and develop capabilities critical to the Nation's technology infrastructure, particularly in energy, education, health, and the environment. The consortium provides its university members with access to Federal research facilities and conducts research involving the use of various radionuclides and chemicals for the Department of Energy (DOE) and other member institutions. Oak Ridge Associated Universities is also the managing and operating contractor for the Oak Ridge Institute for Science and Education.

The South Campus Facility was originally established in 1945 to study accidental irradiation of cattle during testing of the first atomic bomb near Alamogordo, New Mexico. The scope of research soon included studies on the introduction and migration of radioisotopes in the food chain as well as various other agricultural problems.

The Freels Bend Area was used to support research conducted at the South Campus Facility. Its facilities used test animals to investigate the effects of irradiation at low dose rates and at variable dose rates. The test animals were subsequently observed over a period of time for exposure effects. The Scarboro Operations Site of the Oak Ridge Institute for Science and Education was once operated by the University of Tennessee as a comparative animal research laboratory and an agricultural experiment station.

The mission of the Oak Ridge Associated Universities and the Oak Ridge Institute for Science and Education continues to be serving the needs of its member universities and DOE. Although some facilities at the Institute's Scarboro Operations Site will be turned over to Environmental Management for possible decommissioning, most facilities will remain in use for research.

The future use of the Freels Bend Area, the South Campus Facilities, and the Scarboro Operations Site will be decided after the completion of any required remedial action. It is assumed the facilities of the Oak Ridge Associated Universities and the Oak Ridge Institute for Science and Education will continue to be used as research and development and study facilities for the member universities and DOE.

ENVIRONMENTAL RESTORATION

Surveys conducted at various research facilities in the Oak Ridge area have indicated some degree of both radionuclide and chemical contamination are present at the South Campus Facility, the Freels Bend Area, and the Scarboro Operations of the Oak Ridge Institute for Science and Education. The South Campus Facility and the Freels Bend Area have been included in the National Priorities List by the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Environmental Management plans to conduct a complete characterization of contamination at these facilities. Once a record of decision is approved for a site, remedial design, and then remedial action will commence.

The South Campus Facility

The South Campus Facility was used for research with a variety of animals. The primary contamination of concern is a plume of the chlorinated solvent trichloroethylene. This plume is present in a small aquifer but does not extend beyond the site boundary. The source of the chlorinated solvent, used for such purposes as metal cleaning, was an automobile shop on the site before Oak Ridge Associated Universities took over custodianship of the site.

A remedial investigation at the South Campus Facility was conducted in FY 1993. The areas investigated were the wastewater treatment plant, ponds, various laboratories, and animal-containment facilities. A demonstration-scale treatability study has been implemented to determine whether trichloroethane can be removed through the use of wetland activities. The design and specification package for the wetlands test cells was completed, and the initial construction and planning of the vegetation was completed in June 1994.

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	1,268	155	76	5	283	46	4	10,460

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

However, until the treatability study proves successful, the assumed final action for the South Campus Facility is to build a facility for pumping and treating the ground water.

Freels Bend Area

At the Freels Bend Area, animals were irradiated at the Low-Dose-Rate Irradiation Facility and the Variable-Dose-Rate Irradiation Facility and then observed over a period of time to determine the effects of radiation. The animal carcasses were disposed of at three landfills at the site.

The initial survey indicated contaminants of concern are radionuclides, organic chemicals, and metals. The source of the organic and trace metal contaminants is assumed to be from the decayed animal carcasses. The source for radionuclides, to the extent they are present, has not been determined.

A site investigation was performed at the Freels Bend Area in FY 1993. The regions investigated included those associated with the irradiation facilities , the animal-carcass landfills , and three small impoundments in which herds of control animals were kept. The findings of the investigation indicated no further action was needed, and regulators have concurred. DOE does plan, however, to perform a small maintenance action at Freels Bend.

Scarboro Operations Site

At the Scarboro Operations Site of the Oak Ridge Institute for Science and Education, radionuclides were used in experimentation. A preliminary survey indicates three buildings (isotope laboratory, large-animal containment facility, and isolation barn) show evidence of contamination with americium-241, while two buildings also have strontium-90, europium-152, europium-154, and cesium-137 contamination. The isotope laboratory is contaminated with carbon-14, tritium, cobalt-60, and cadmium-109. Two buildings may also contain asbestos.

WASTE MANAGEMENT

All waste management activities for the Oak Ridge Associated Universities and the Oak Ridge Institute for Science and Education are

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	178	0	0	0	0	0	0	1,069
Remedial Actions	1,090	155	76	5	0	0	0	7,721
Surveillance And Maintenance	0	0	0	0	283	46	4	1,670
Total	1,268	155	76	5	283	46	4	10,460

** Costs reflect e five-yaar avarage in constant 1995 dollers, except in FY 1995-2000, which is a six-yeer everege.*

*** Total Lifa Cycle is the sum of annuel costs in constent 1995 dollars.*

part of and funded by the environmental restoration program. It is assumed all waste generated by this program will be sent to waste management facilities at the Oak Ridge National Laboratory.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The Oak Ridge Institute for Science and Education has not yet entered the facility stabilization program, but it is assumed it will do so in 1996. The six institute facilities expected to enter this program include an isolation barn, an isotope laboratory, and a variable-dose-rate irradiation facility. This report assumes the stabilization and maintenance process for facilities at the institute will be completed by 2013.

LANDLORD FUNCTIONS

The Oak Ridge Associated Universities program is not responsible for landlord or infrastructure functions other than those required by environmental restoration or facility stabilization and maintenance.

PROGRAM MANAGEMENT

Program management provides for prime-contractor support to the environmental restoration program. Financial funding is also provided for the State of Tennessee to support its independent monitoring and oversight of DOE facilities as outlined in an agreement with the State. Program management also provides essential technical support, administrative integration, and oversight services to ensure proper identification, characterization, remediation, and revitalization of contaminated sites. These support areas include technical programs, technical oversight, community relations, analytical projects, integration of management activities for waste generated in environmental restoration, and business management.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Oak Ridge Institute for Science and Education.

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	127	401	394	32	0	0	0	4,898

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	137	318	320	353	58	0	0	6,067

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of ennual costs in constent 1995 dollars.

Nondefense Funding Cost Estimate

*Five-Year Average (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle
Nuclear Material and Facility Stabilization	9	28	28	0	0	0	0	334

* Costs reflect e five-year everage in constant 1995 dollars, except in FY 1995-2000, which Is a six-year average.

** Total Llfe Cycle is the sum of annual costs In constent 1995 dollars.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Llfe Cycle**
Environmental Restoration	1,268	155	76	5	283	46	4	10,460
Nuclear Material and Facility Stabilization	118	373	366	0	0	0	0	4,564
Program Management	137	318	320	353	58	0	0	6,067
Total	1,532	858	774	358	342	46	4	21,091

* Costs reflect e five-yeer everege in constent 1995 dollers, except in FY 1995-2000, which is e six-year everege.

** Totel Life Cycle is the sum of ennuel costs in constent 1995 dollers.

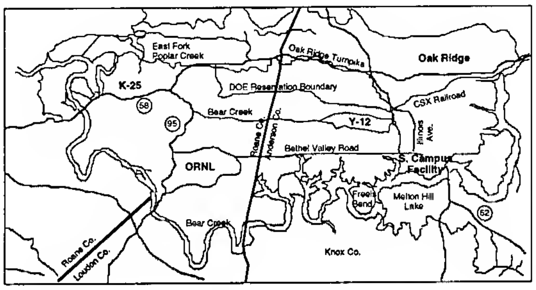
Major Activity Milestones

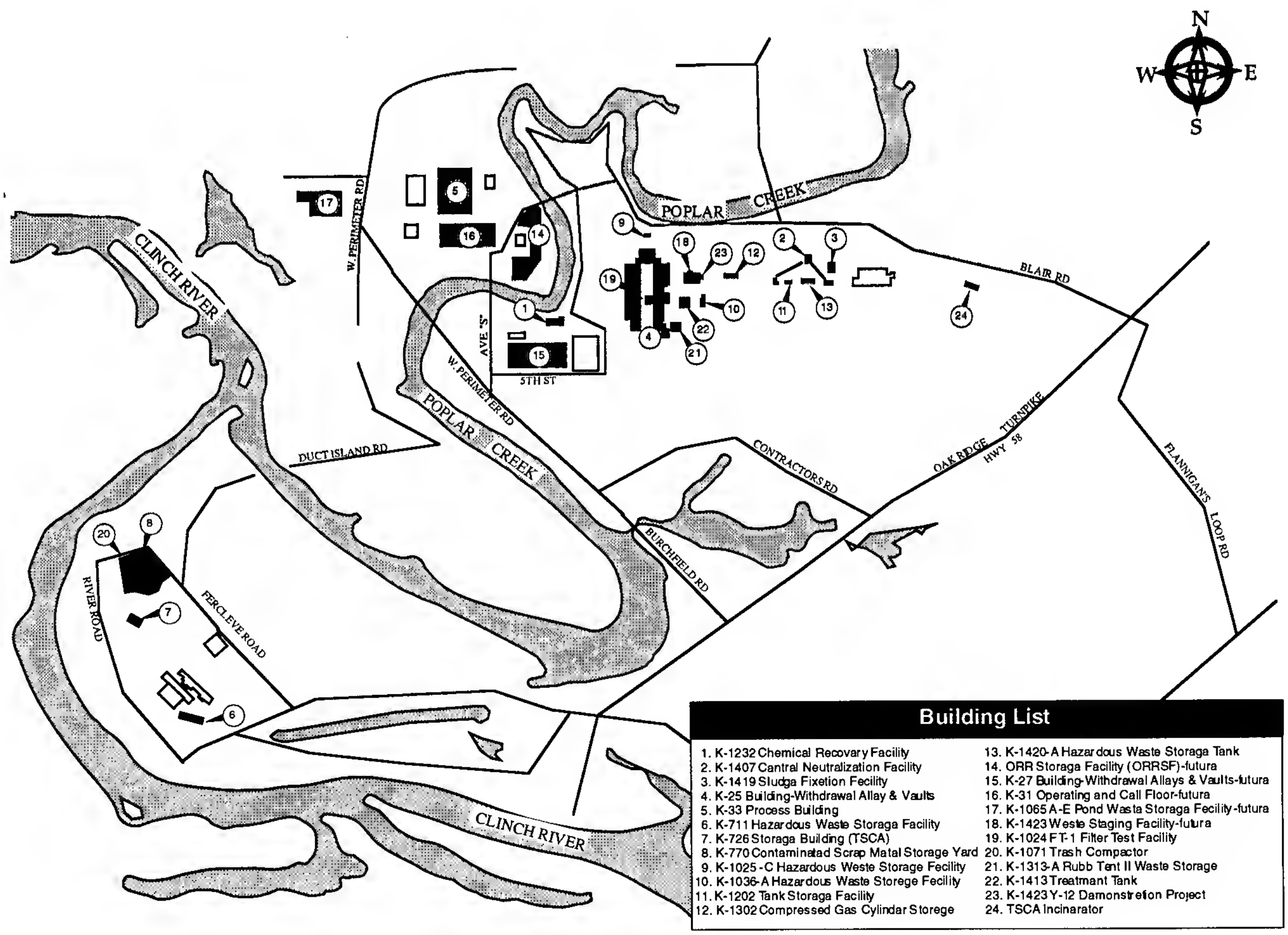
ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Sauth Campus Facility - Remediatian Camplete	2011
	Camplete all Environmental Restaration Activities	2030
Nuclear Material and Facility Stabilizatian		Fiscal Year
	Camplete all Nuclear Material and Facility Stabilization Activities	2013

For further information on this site, please contact: *Public Participation Office* *(615) 576-0314*
Public Affairs Office *(615) 576-0885*
Technical Liaison: Marianne Heiskell *(615) 576-0314*

OAK RIDGE K-25 SITE

The Oak Ridge K-25 Site occupies 1,500 acres adjacent to the Clinch River, 13 miles west of Oak Ridge, Tennessee.





Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	116,700	85,700	129,100	101,500	93,200	100,200
Waste Management	104,600	120,000	166,600	254,000	259,000	256,600
Directly Appropriated Landlord	19,100	17,900	18,700	19,000	19,000	28,800
Program Management	13,600	16,800	23,100	22,000	20,200	15,200
Total	254,000	240,400	337,500	396,500	391,400	400,800

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	97,287	66,466	73,345	62,917	109,491	191,732	249,382
Waste Management	177,009	140,182	164,531	167,685	169,106	168,269	117,709
Directly Appropriated Landlord	40,894	27,100	27,100	27,100	27,100	27,100	27,100
Program Management	21,003	42,948	47,895	54,978	58,468	102,827	94,558
Total	336,193	276,696	312,872	312,681	364,164	489,927	488,750

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	228,289	167,713	196,817	148,297	151,301	0	0	8,812,471
Waste Management	89,508	74,207	7,887	669	540	424	37	6,565,825
Directly Appropriated Landlord	27,100	27,100	27,100	27,100	27,100	0	0	1,735,864
Program Management	79,868	61,878	44,295	29,080	30,326	106	9	3,362,200
Total	424,765	330,898	276,099	205,146	209,267	530	46	20,476,360

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The K-25 Plant was built between 1943 and 1946 as part of the Manhattan Project. Its mission was to produce enriched uranium by the gaseous-diffusion process. The plant was expanded between 1950 and 1954. Through 1964, the site was used primarily for the production of highly enriched uranium for nuclear weapons. However, from 1959 to 1969 production shifted to commercial-grade, low-enrichment uranium to support the nuclear power industry. In 1985, the gaseous-diffusion facilities were placed on standby and were shut down permanently in 1987. The site also served as host for centrifuge facilities constructed as part of a program for the development and demonstration of uranium-enrichment technology. These facilities have also been shut down.

The K-25 Site was designated the Center for Environmental Technology and the Center for Waste Management in May 1993. It is the central location for Oak Ridge Reservation's environmental restoration and waste management program. This mission of supporting DOE's Environmental Management program is expected to continue for the foreseeable future.

The ultimate use of the site is yet to be decided. However, since Government surveillance, maintenance, and institutional controls at the site will have to be continued indefinitely, future uses will be limited.

ENVIRONMENTAL RESTORATION

Most of the K-25 process facilities were constructed in the 1940's and 1950's. The waste generated in those days, and much of the construction material, process fluids, and the auxiliary materials used in the gaseous-diffusion process, are now considered hazardous and are regulated under today's standards. Past operations generated plating waste, waste solutions, trash contaminated with radioactivity, debris, and other materials capable of polluting the environment. Environmental pollution resulted from accidental leaks and spills and discharges of radionuclides or chemicals into the

Environmental Restoration Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
External Areas	4,478	4,055	483	0	0	0	0
Ground Water Project	9,468	8,020	19,960	9,971	4,354	0	0
K-25 Decommissioning	63,579	47,468	44,642	48,520	76,521	172,720	237,770
Main Plant Area	7,421	5,148	6,381	2,543	10,932	2,529	2,687
Pond Waste Management Project	10,670	0	0	0	0	0	0
Process Areas	37	0	0	0	16,191	16,483	8,926
Surveillance and Maintenance Project	1,635	1,774	1,879	1,883	1,494	0	0
Total	97,287	66,466	73,345	62,917	109,491	191,732	249,382

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
External Areas	0	0	0	0	0	0	0	49,560
Ground Water Project	0	0	0	0	0	0	0	268,329
K-25 Decommissioning	226,973	167,685	196,817	148,297	151,301	0	0	7,975,051
Main Plant Area	396	0	0	0	0	0	0	197,601
Pond Waste Management Project	0	0	0	0	0	0	0	64,017
Process Areas	919	28	0	0	0	0	0	212,956
Surveillance and Maintenance Project	0	0	0	0	0	0	0	44,957
Total	228,289	167,713	196,817	148,297	151,301	0	0	8,812,471

* *Costs raflact e five-yaar averega in constent 1995 dollars, axcapt in FY 1995-2000, which is a six-yaar averaga.*

** *Total Lifa Cycla is the sum of ennuel costs in constant 1995 dollars.*

environment. It also resulted from the migration or deposition of contaminants from the K-25 Plant during gaseous-diffusion operations or from storage and burial grounds once deemed acceptable under standards then in existence.

The shutdown K-25 facilities contain large quantities of asbestos; oils; and equipment containing polychlorinated biphenyls (PCBs), coolants, lubricating oils, and radioactive materials. These materials will be managed in place (see the discussion under "Process Plant" below) until they can be removed and treated, stored, or disposed. In many of the facilities, contamination has become fixed on equipment and structures, and these must, therefore, be handled like hazardous or low-level radioactive waste. The facilities also hold special nuclear material, residual radionuclides (mainly uranium), and classified hardware and materials to be managed in place until appropriately dispositioned.

Contamination in soils, ground and surface waters, and old waste sites is being addressed by remedial action. Unless there is an immediate threat to the environment, safety, and/or health, these contaminants will be managed in place until remediation can be completed. After remediation, the site will still require institutional controls, and some areas, such as old waste-disposal grounds, will not be available for other uses in the future. Other areas are assumed to be used for industrial purposes in the future.

For environmental restoration, operable units consisting of solid waste management units have been identified for the K-25 Site. Most operable units will proceed through the formal remediation process of a remedial investigation and feasibility study through remedial design, remedial action, and verification. Some units may encompass areas requiring interim actions as new information becomes available. The K-25 Site has been divided into three major areas, including the main plant, the process plant, and the external plant.

Main Plant

The Main Plant includes the main plant laboratory, centrifuge enrichment facilities, and administrative areas. It includes several ponds, waste-accumulation areas, cooling towers, acid pits, and burial grounds.

The contamination includes a variety of hazardous as well as mixed wastes resulting from operations at the gaseous-diffusion facilities and the laboratories in the Main Plant. The remedial actions will include removal of tanks and other smaller contaminated units, and containment structures in locations with larger areas of contamination. The centrifuge facilities were constructed as part of the program for technology development and demonstration that was carried out at the site between 1960 and 1985. A large portion of the facilities in these buildings currently contains contaminated equipment and process materials. A surveillance and maintenance program is being used to keep the facilities in a safe condition prior to decommissioning. The decommissioning will involve the removal of contaminated equipment and materials, discussed earlier, and the decontamination of floors and walls, decontamination of centrifuges and piping materials, and disposal of waste materials.

Process Plant

The process plant area contains most of the gaseous-diffusion facilities requiring decommissioning. The program for accomplishing this is divided into two phases. The first phase consists of safe-shutdown activities involving the surveillance and maintenance of facilities and the removal of hazardous materials and equipment. The second phase entails the ultimate disposition of equipment internally contaminated with uranium and the final disposition of process

and auxiliary buildings. Surveillance and maintenance will continue into phase two at a progressively decreasing rate as buildings are decommissioned.

Residual uranium will be removed from the interior of process equipment by a mobile gaseous decontamination system, and then all contaminated process equipment will be transported to a single decontamination facility on the Oak Ridge Reservation. After decontamination and volume reduction, the waste will be returned to the K-25 Site for disposal. The process buildings remaining after the removal of the process equipment and auxiliaries will then be decontaminated. All of the interior surfaces are assumed to be contaminated. The facilities will be cleaned of radioactive and hazardous materials, which will be disposed of in appropriately designed disposal facilities. The major hazardous materials are asbestos in the insulation for the piping systems and in the transite siding of all buildings, and PCBs that are found throughout the electrical equipment, the ventilation systems of the process buildings, and in local areas of the floors in these buildings. The facilities will be treated to remove surface contamination to prepare them for unrestricted release. Building materials like transite siding and roofing are likewise contaminated and are to be totally removed and disposed of. All that will remain will be the superstructure of the facilities.

The K-25 Site also provides storage for special nuclear materials not considered waste; in particular, approximately 5,000 cylinders of depleted uranium hexafluoride. Other materials stored inside the K-25 buildings include approximately 55,000 fifty-five-gallon drums of lithium hydroxide, a strongly alkaline crystalline or granular solid, stored in about 300,000 square feet of warehouse space. Safety documentation from the K-25 Site is kept up to date to identify the hazards and risks associated with the storage of these materials (as well as other hazards related to the process buildings) to protect site workers, the public, and the environment.

External Plant

The external plant area includes two operable units west of the K-25 Site and outside the perimeter fence. The K-901 Operable Unit contains the following release units: a burial ground, a landfarm, the North Disposal Area, the South Disposal Area, and a holding pond. The K-770 Operable Unit contains the following release sites: the beryllium building, contaminated debris, the scrap-metal yard, a switchyard, the property sales building, sludge beds and Imhoff tanks, and the storage building for waste regulated under the Resource Conservation and Recovery Act. Also present here is the coal and bottom-ash pile listed as an early action. There are five study areas having single release sites, and one study area has three release sites. This estimate assumes remedial action will include containment or no further action alternatives.

Ground Water

The ground water at the K-25 Site is treated as one unit. This estimate assumes that a two-phase remedial investigation and feasibility study will be conducted and a decision of no further action will result. Ground-water monitoring will be continued throughout the life cycle of the program.

Pond-Waste Project

This project resulted from a canceled effort to dewater and repack more than 70,000 drums of partially solidified and raw sludge stored on external pads at the K-25 Site. Current activities include the decontamination and demobilization

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
External Areas							
Assessment	1,472	0	0	0	0	0	0
Remedial Actions	3,006	4,055	483	0	0	0	0
Ground Water Project							
Assessment	9,468	8,020	19,960	9,971	4,354	0	0
K-25 Facility Decommissioning							
Assessment	44,987	45,504	36,936	19,148	22,192	9,082	44,719
Facility Decommissioning	18,593	1,964	7,706	29,372	54,329	163,638	193,051
Main Plant Area							
Assessment	3,110	3,861	5,556	1,391	7,729	854	0
Remedial Actions	4,311	1,287	826	1,152	3,202	1,674	2,687
Pond Waste Management Project							
Remedial Actions	10,670	0	0	0	0	0	0
Process Areas							
Assessment	37	0	0	0	16,191	2,114	0
Remedial Actions	0	0	0	0	0	14,369	8,926
Surveillance and Maintenance Project							
Assessment	1,635	1,774	1,879	1,883	1,494	0	0
Total	97,287	66,466	73,345	62,917	109,491	191,732	249,382

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
External Areas								
Assessment	0	0	0	0	0	0	0	8,832
Remedial Actions	0	0	0	0	0	0	0	40,728
Ground Water Project								
Assessment	0	0	0	0	0	0	0	268,329
K-25 Facility Decommissioning								
Assessment	59,318	15,642	8,779	0	0	0	0	1,576,518
Facility Decommissioning	167,655	152,043	188,038	148,297	151,301	0	0	6,398,533
Main Plant Area								
Assessment	0	0	0	0	0	0	0	115,619
Remedial Actions	396	0	0	0	0	0	0	81,983
Pond Waste Management Project								
Remedial Actions	0	0	0	0	0	0	0	64,017
Process Areas								
Assessment	0	0	0	0	0	0	0	91,744
Remedial Actions	919	28	0	0	0	0	0	121,213
Surveillance and Maintenance Project								
Assessment	0	0	0	0	0	0	0	44,957
Total	228,289	167,713	196,817	148,297	151,301	0	0	8,812,471

** Costs raflact a fiva-yaar avarage in constant 1995 dollars, excapt in FY 1995 - 2000, which is a six-yaar avaraga.*

*** Total Life Cycla is the sum of annual costs in constant 1995 dollars.*

of vendor equipment, the repackaging of externally stored drums and their placement into compliant storage, and the offsite treatment and disposal of sludge previously stored in drums.

WASTE MANAGEMENT

K-25 Site generates low-level radioactive waste, low-level mixed waste, aqueous waste, and hazardous chemical waste, including liquid organic waste. These waste streams require different methods of treatment and different strategies for disposal. Definitions of waste types are given in the introduction to this volume.

The current generation rates for the waste are as follows: low-level radioactive waste, 150,000 cubic feet; low-level mixed waste, 6 million cubic feet; hazardous chemical waste, 25,000 cubic feet; and sanitary waste, 90,000 cubic feet. These waste volumes are based on FY 1993 and FY 1994 actual figures and, as such, do not include volumes of waste from environmental restoration or facility stabilization activities. With the exception of environmental restoration activity waste, waste generation is assumed to remain effectively constant for the baseline period.

Waste Treatment

Waste treatment will be specifically designed to support disposal, assuming the applicable waste acceptance criteria are available. Treatment activities are focused around the need to provide the treatment capability required by the Resource Conservation and Recovery Act for mixed waste (i.e., waste with restrictions on land disposal). To provide the needed capability, a private-sector participation program will identify and implement private-sector technologies and strategies to facilitate the management of mixed waste, such as the design, construction, ownership, and operation of private-sector facilities for waste treatment, packaging, transportation, and disposal.

Waste-treatment operations at the K-25 Site include the incineration of liquid waste at an incinerator built to comply with the Toxic Substances Control Act, and treatment of liquid waste at the Central Neutralization Facility. The incinerator and the Central Neutralization Facility will be upgraded to meet more restrictive regulatory requirements and to process greater volumes and more-diverse waste streams. Liquid sanitary waste disposal systems will also be upgraded. In addition to these major projects, current infrastructure repairs will be required throughout the planning horizon to maintain the operability of waste-treatment facilities.

Major Waste Management Projects

*Five-year Averages (Thousands of Constant 1995 Dollars)**

	1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Central Neutralization Facility	3,083	2,120	0	0	0	0	0	29,100
LLW Disposal Facility	6,400	14,520	19,660	20,800	20,800	20,800	3,900	540,800
Mixed Waste Infrastructure	34,817	35,600	23,200	23,200	23,200	23,200	4,360	872,700
TSCA Incinerator Upgrade	2,250	0	0	0	0	0	0	13,500

** Costs reflect e five-yeer average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** Total Life Cycle is the sum of ennuel costs in constant 1995 dollers.*

Note: These projects represent a subset of waste menagement ectivities. Associated program management costs are built-in to the estimates provided.

Waste Storage

The K-25 Site has facilities to store low-level radioactive, fissile, mixed low-level, PCBs, and hazardous chemical waste. Waste in storage is nondestructively examined to certify it meets the acceptance criteria at the receiving disposal facilities.

Waste storage facilities consist of modified portions of former uranium enrichment process buildings. Vaults used to store hazardous, mixed, and PCB waste have had interim diking installed, floors coated with chemical resistant sealant, and lightning and fire protection upgrades.

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Low-Level Mixed Waste	84,645	54,217	54,217	54,217	56,710	65,454	59,357
Low-Level Waste	4,780	12,166	12,166	12,166	12,166	10,473	1,718
Storage and Handling							
Transuranic Waste	3,461	750	168	0	0	1	5
Low-Level Mixed Waste	1,443	3,887	4,627	4,627	4,905	5,748	4,333
Low-Level Waste	2,463	574	574	574	574	574	574
Disposal							
Low-Level Mixed Waste	4,595	5,975	12,066	14,904	13,961	11,986	8,524
Low-Level Waste	13,509	37,339	55,195	55,393	55,413	48,606	17,861
Hazardous Waste	16,923	5,953	5,933	5,956	6,056	6,107	6,017
Sanitary Waste	9,263	3,960	4,224	4,488	3,960	3,960	3,960
Other							
Waste Management T/S/D	35,928	15,360	15,360	15,360	15,360	15,360	15,360
Total	177,009	140,182	164,531	167,685	169,106	168,269	117,709

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Low-Level Mixed Waste	54,538	44,446	4,288	0	0	0	0	2,745,097
Low-Level Waste	494	494	494	494	494	403	34	347,491
Storage and Handling								
Transuranic Waste	3	4	0	0	0	0	0	25,415
Low-Level Mixed Waste	2,919	2,417	807	85	0	0	0	180,429
Low-Level Waste	574	651	766	0	0	0	0	41,956
Disposal								
Low-Level Mixed Waste	5,444	3,833	1,380	0	0	0	0	417,936
Low-Level Waste	282	187	153	90	47	21	4	1,433,998
Hazardous Waste	5,934	5,928	0	0	0	0	0	340,960
Sanitary Waste	3,960	3,960	0	0	0	0	0	217,936
Other								
Waste Management T/S/D	15,360	12,288	0	0	0	0	0	814,606
Total	89,508	74,207	7,887	669	540	424	37	6,565,825

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Waste Disposal

Disposal for the low-level radioactive waste generated at the K-25 Site will be provided at central disposal facilities to be developed for the Oak Ridge Reservation. Costs for disposal of K-25 waste are accounted here as shown in the waste management projects and activities tables. The construction of the facilities is scheduled to start in FY 1999, and the start of operations is expected in FY 2004. Waste incapable of accommodation at this central facility will be shipped to other DOE sites. Operations also provide for use of offsite DOE-owned facilities as well as private capability for disposal of low-level mixed and hazardous waste.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

K-25 currently has no nuclear material or facility stabilization activity. The entire facility is currently undergoing decommissioning.

LANDLORD FUNCTIONS

The Office of Environmental Management has landlord responsibilities at the K-25 Site. These responsibilities include providing for capital equipment and construction needs, maintaining the infrastructure and equipment, and providing general site support (i.e., general administration; implementation of the environmental, safety, and health program; and security). The landlord responsibilities will continue until the site has been closed.

PROGRAM MANAGEMENT

Program management, through the technical integration and contract-management functions, provides essential technical support, administrative integration, and oversight to environmental restoration and waste management. This support is aimed at ensuring the proper identification, characterization, remediation, and revitalization of contaminated sites. It includes technical programs, technical oversight, community relations, the integration of environmental restoration with waste management, and business management.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	21,003	42,948	47,895	54,978	58,468	102,827	94,558	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Program Management	79,868	61,878	44,295	29,080	30,326	106	9	3,362,200

** Costs reflect a five-year averege in constent 1995 dollers, except in FY 1995-2000, which is e six-yeer everege.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Included in program management is funding for the State of Tennessee to support its independent monitoring and oversight of activities and facilities as outlined in the Agreement-in-Principle with the State.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for K-25.

Landlord Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Directly Appropriated Landlord	40,894	27,100	27,100	27,100	27,100	27,100	27,100

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Directly Appropriated Landlord	27,100	27,100	27,100	27,100	27,100	0	0	1,735,864

* Costs reflect e five-year averege in constant 1995 dollers, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of ennuel costs in constant 1995 dollars.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	97,287	66,466	73,345	62,917	109,491	191,732	249,382
Waste Management	177,009	140,182	164,531	167,685	169,106	168,269	117,709
Directly Appropriated Landlord	40,894	27,100	27,100	27,100	27,100	27,100	27,100
Program Management	21,003	42,948	47,895	54,978	58,468	102,827	94,558
Total	336,193	276,696	312,872	312,681	364,164	489,927	488,750

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	228,289	167,713	196,817	148,297	151,301	0	0	8,812,471
Waste Management	89,508	74,207	7,887	669	540	424	37	6,565,825
Directly Appropriated Landlord	27,100	27,100	27,100	27,100	27,100	0	0	1,735,864
Program Management	79,868	61,878	44,295	29,080	30,326	106	9	3,362,200
Total	424,765	330,898	276,099	205,146	209,267	530	46	20,476,360

* Cost reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	K-25 Decommissioning of PCB Electrical Components - Complete Decommissioning	1995
	K-25 Decommissioning Electrical Compliance - Complete Construction	1995
	Powerhouse Area Demolition - Complete Demolition	1996
	K-1070 SW31 Spring - Complete Remediation	1996
	K-1407 B&C Ponds - Complete Remediation	1996
	UF6 Cylinder Yard & Refurbish Facility - Complete Construction	1997
	K-25 Emergency Notification System - Complete Construction	1997
	K-1417 & K-1419 RCRA Closure - Complete Remediation	1998
	PWMP - Sludge Treatment - Complete Remediation	1998
	PWMP - Repackaging & Equipment Decontamination - Complete Remediation	1998
	K-25 Cooling Tower Demolition - Complete Demolition	2000
	Uranium Deposit Removal - Complete Remediation	2002
	UF6 Cylinders Inspection & Integrity Assessment - Complete Remediation	2002
	K-901 OU - Complete Remediation	2006
	K-1070 OU - Complete Remediation	2006
	K-770 OU - Complete Remediation	2007
	K-1007 OU - Complete Remediation	2009
	K-25 Converter Shell Disposal - Complete Remediation	2015
	K-25 Centrifuge Facilities Decommissioning - Complete Decommissioning	2018
	K-25 Rad Characterization & Decontamination - Complete Decontamination	2020
	K-1401 OU - Complete Remediation	2025
	K-25 OU - Complete Remediation	2025
	K-1407 OU - Complete Remediation	2025
	K-25 Decommissioning Asbestos Removal - Complete Removal	2030
	K-1004 OU - Complete Remediation	2030
	K-29 OU - Complete Remediation	2035
	K-1410 OU - Complete Construction	2035
	K-1420 OU - Complete Remediation	2035

Major Activity Milestones (cont'd)

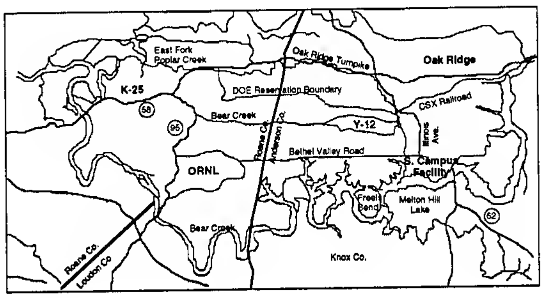
ACTIVITY	TASK	COMPLETION DATE
Environmental Restaratian (cant'd)		Fiscal Year
	K-1413 OU - Camplete Remediatian	2035
	K-33 OU - Camplete Remediatian	2035
	K-1064 OU - Complete Remediatian	2040
	Complete K-25 Environmentol Restaration Activities	2055
Waste Management		Fiscal Year
	Camplete CNF Pipeline Extensian	1995
	Camplete Sewage Callection System Rehobilatian Facility	1996
	Complete TSCA Off-Gos Upgrode	1999
	Camplete CNF Upgrades	2000
	Complete K-25 Waste Monogement Activities	2060

For further information on this site, please contact:

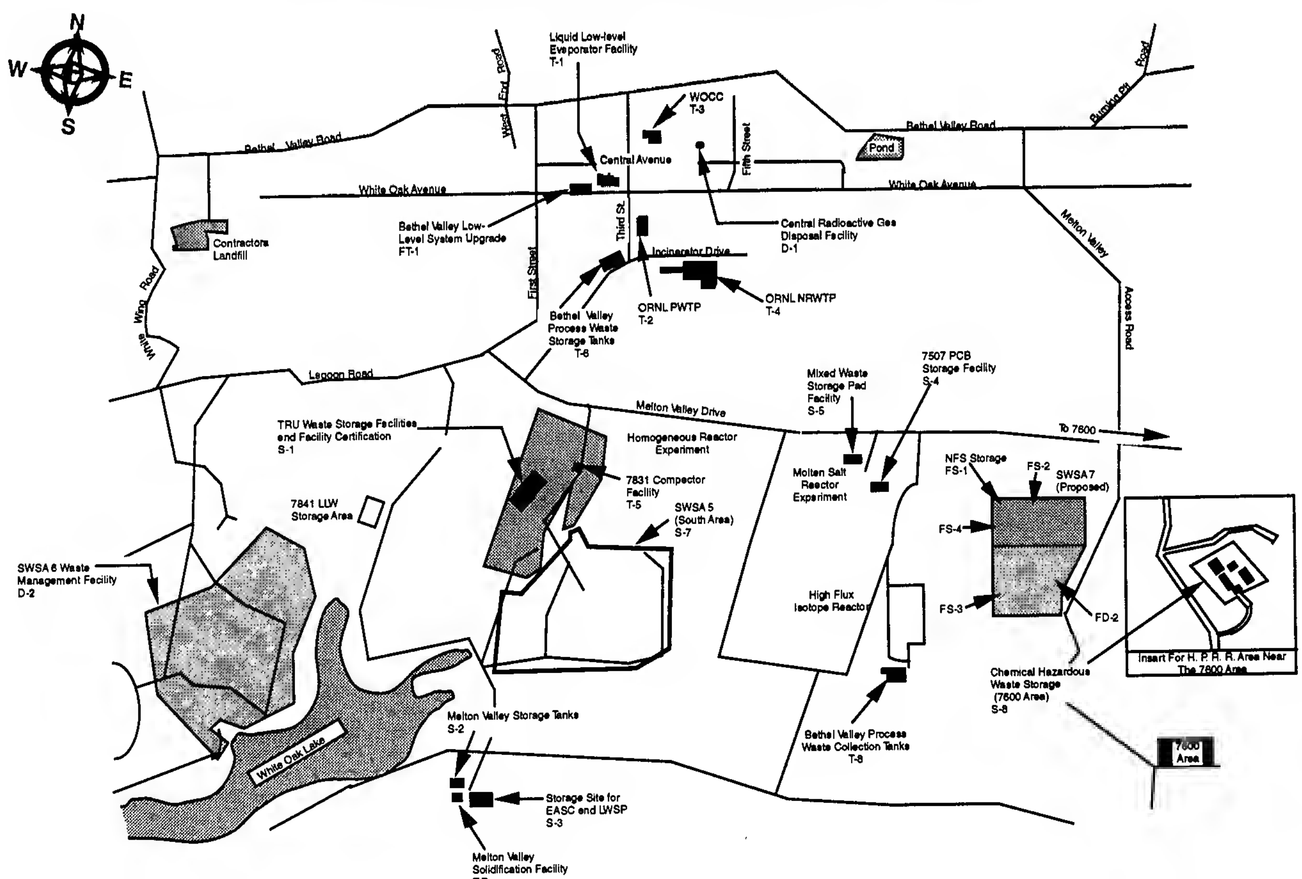
Public Participation Office		*(615) 576-1590*
Public Affairs Office		*(615) 576-0885*
Technical Liaison:	*Mike Travaglini*	*(615) 576-0848*
	Bill Gilbert	*(615) 576-1817*

OAK RIDGE NATIONAL LABORATORY

The Oak Ridge National Laboratory occupies approximately 2,900 acres in Melton and Bethel Valleys, 10 miles southwest of downtown Oak Ridge, Tennessee. The Laboratory is part of the U.S. Department of Energy's (DOE) Oak Ridge Reservation.



OAK RIDGE NATIONAL LABORATORY WASTE MANAGEMENT SITE MAP



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	67,700	63,500	70,700	68,900	85,000	76,300
Waste Management	116,500	72,800	118,500	120,100	133,900	182,800
Nuclear Material and Facility Stabilization	13,656	13,100	15,900	16,300	16,900	17,500
Program Management	6,800	10,300	12,700	15,000	18,400	12,700
Total	200,200	159,700	217,800	220,300	254,200	289,300

* Costs for FY 1995 reflact Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 raflect Budgat Shortfall Scanario, costs for shaded area assuma 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	68,969	142,689	157,942	209,749	164,306	72,151	45,006
Waste Management	114,240	166,425	127,119	104,506	107,037	105,971	82,592
Nuclear Material and Facility Stabilization	13,655	11,670	15,927	5,926	1,665	2,162	2,466
Program Management	20,472	66,278	58,677	40,977	32,463	51,857	42,108
Total	217,335	387,062	359,565	360,547	305,471	232,141	172,172

	2035	2040	2045	2050	2055	2060	2065	Life-cycle***
Environmental Restoration	9,116	2,706	423	0	0	0	0	4,434,247
Waste Management	72,298	51,588	12,172	99	8	4	1	4,834,533
Nuclear Material and Facility Stabilization	5,953	47	0	0	0	0	0	307,385
Program Management	29,546	18,686	3,355	25	2	1	0	1,842,801
Total	116,918	73,026	15,951	123	10	5	1	11,418,966

** Costs raflact a fiva-year avarage in constant 1995 dollars, axcapt in FY 1995 - 2000, which is a six-yaar avarage.

*** Total Lifa Cycla is tha sum of Annual Costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Weapons research facilities were established at the site of the Oak Ridge National Laboratory in 1943. Initially, Oak Ridge operated a pilot-scale nuclear reactor to serve as the prototype for today's production reactors and a pilot plant for reprocessing nuclear fuel to recover plutonium and uranium for nuclear weapons. Its role in the development of nuclear weapons decreased over time, but the scope of its work was expanded to include production of isotopes, fundamental research in a variety of sciences, research involving hazardous and radioactive materials, environmental research, and radioactive waste disposal.

Today, the Oak Ridge National Laboratory is one of the country's largest multidisciplinary

and multiprogram laboratories and research facilities. Its primary mission is to perform leading-edge nonweapons research and development. Other missions include contributing to the national initiative to improve science and mathematics education.

The Oak Ridge National Laboratory is expected to remain an important national research and development facility well into the future. The ultimate use of the site is yet to be decided; however, any future uses will be limited by long-term surveillance, maintenance, and institutional controls expected to continue indefinitely.

Environmental restoration activities will conclude in 2045 at the assumed funding level. However, laboratory operations will continue to generate waste and, as a result, waste management activities in support of ongoing programs will continue. Nevertheless, to facilitate the development of this life-cycle cost estimate, an arbitrary cutoff date of 2029 in support of nonenvironmental management program activities has been assigned to all sites having completed environmental restoration but maintaining ongoing waste management support of other DOE programs (Energy Research, Defense Programs, etc.). Waste management activities costs beyond 2029 are only those associated with ongoing environmental restoration activities.

ENVIRONMENTAL RESTORATION

Since its establishment in 1943, operations at the Oak Ridge National Laboratory have produced a legacy of contaminated facilities; soils and waters polluted with radionuclides, heavy metals, and chemicals from waste-disposal practices with insufficient containment; and environmental pollution from spills and leaks. The Oak Ridge Reservation, including Oak Ridge National Laboratory, was added to the Environmental Protection Agency's (EPA) National Priorities List in December 1989.

The environmental restoration program has identified about 350 sites contaminated with radioactivity or hazardous chemicals. Because of the large number of contaminated sites and the complexity of the hydrologic conditions at Oak Ridge, the sites have been combined into 20 waste area groups generally defined by small watersheds containing contiguous and similar waste sites. In some cases, grouping is necessary because individual sites are hydrologically inseparable. The use of groups allows perimeter monitoring of both ground water and surface water and the development of a response protective of human health and the environment.

Waste area groups are comprised of one or more operable units, a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) term. Several solid waste management units, storage areas for hazardous solid waste, can be combined into an single operable unit. Most of the solid waste management units are related to the Laboratory's operations in the management of both solid and liquid radioactive waste.

Of the 20 waste area groups, 9 are active projects in the environmental restoration program: groups 1, 2, 4, 5, 6, 7, 10, 11, and 13. Another active project is the Laboratory's ground-water program. Except for group 2, the waste area groups are sources of contaminants for other areas. Each of the contaminant-source waste area groups will be characterized. It will then be possible to identify small operable units and to set priorities for remediation and cleanup.

Environmental Restoration Projects

Five-Year Average (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Bethel Valley	0	10	6,253	8,024	6,512	545	1,343
Decommissioning	7,589	6,295	25,140	63,315	106,960	60,095	33,221
Main Plant	16,239	68,714	30,154	5,899	4,898	901	154
Melton Valley	34,992	55,412	82,684	114,536	30,127	7,731	8,031
Oak Ridge National Laboratory	5,278	7,352	8,722	9,753	8,262	2,291	1,968
Surveillance and Maintenance Project	4,870	4,903	4,986	4,978	3,951	0	0
Total	68,969	142,688	157,942	209,748	164,305	72,150	45,005

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Bethel Valley	1,043	0	0	0	0	0	0	118,664
Decommissioning	4,276	0	0	0	0	0	0	1,542,059
Main Plant	302	117	10	0	0	0	0	653,206
Melton Valley	2,741	1,990	262	0	0	0	0	1,716,825
Oak Ridge National Laboratory	680	0	0	0	0	0	0	226,826
Surveillance and Maintenance Project	0	0	0	0	0	0	0	123,321
Total	9,116	2,705	423	0	0	0	0	4,434,247

** *Costs reflect e five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-yeer everage.*

*** *Total Life Cycle is the sum of ennuel costs in constent 1995 dollars.*

Waste Area Groups 1 and 3: the Bethel Valley Area

Waste Area Group 1: the Main Plant Area

Waste Area Group 1, the Laboratory's main plant area, contains about half the remedial action sites identified to date. It lies within the Bethel Valley portion of the White Oak Creek drainage basin. The total area of the basin in Bethel Valley is about 2,040 acres. The bedrock consists of limestone, siltstone, and calcareous shale.

Most of the sites in this group were used to collect and to store low-level waste in tanks, ponds, and waste treatment facilities, but some also include landfills and spill and leak sites identified during the last 40 years. Contaminated ground water from some of these sites reaches White Oak Creek and its tributaries through seeps. Twelve gunite tanks, centrally located in Waste Area Group 1, received liquid radioactive waste from research activities from 1943 through the late 1970's. These tanks contain an estimated 95 percent of the radioactivity inventory in Waste Area Group 1. Because this group hosts an operating multifunctional site with a large work force, remediation will be technically and logistically complicated.

Waste Area Group 1 is divided into 10 operable units, and each operable unit has its own remediation process and schedule. Remedial actions will be performed in the near future for three units: the gunite tanks, the surface impoundments, and a contaminant plume in corehole 8. Early actions are planned for some

of the tanks in a steel-tanks unit. Final remediation of the ground water, pipelines, and storm drains in this waste area group, and sediments in White Oak Creek should be delayed until other contaminant sources and soil units have been remediated.

Proposed treatability studies for the gunite tanks will demonstrate sluicing technologies for removing the tank contents including conventional sluicing with a nozzle, using mixer pumps, and using a manipulator arm.

Surface impoundment remediation is being conducted under the streamlined approach for environmental restoration, one of only five such projects at DOE sites across the United States. Principal radionuclide contaminants are strontium-90, cesium-137, and tritium.

A removal action for the plume in corehole 8 is planned for FY 1995. The plume transports contaminants, mainly strontium-90, westward to First Creek via discrete ground-water flowpaths and seepage into the Laboratory's storm drains. Sampling in First Creek indicates this plume is a major source of strontium-90 to the White Oak Creek drainage. The origin of the contamination is unknown at this time.

Waste Area Group 3

Waste Area Group 3 is about 0.6 mile west of the main plant area. It covers Solid-Waste Storage Area 3, a closed scrap-metal yard, and an active landfill. Storage Area 3 and the closed scrap-metal yard are inactive landfills known to contain radioactive solid waste and surplus materials generated at Oak Ridge from 1946 to 1979. The active landfill, opened in 1975, is used to dispose of uncontaminated construction materials and steam plant fly ash. Waste Area Group 3 is located along a drainage divide, with most surface and ground water discharging into White Oak Creek. It is of low risk, and no action is planned for the immediate future.

Waste Area Groups 2, 4 through 10, and 12: the Melton Valley Area

Waste Area Group 2

Waste Area Group 2 encompasses a portion of White Oak Creek, the Melton Branch (a tributary of White Oak Creek) and its flood plains, White Oak Lake, and the White Oak Creek Embayment at the confluence of the Clinch River. This group is downgradient from all contaminant-source waste area groups in the watershed. It, therefore, receives and integrates contaminants released from the nine waste area groups in the watershed: groups 1, 3 through 9, and 17. Consequently, group 2 is termed an "integrator" group, and it is a conduit for contaminants moving through the surface-water system to White Oak Creek and, thus, to offsite areas.

There is little doubt Waste Area Group 2 is a source of continuing contaminant release (radionuclides and hazardous chemicals) to Clinch River. While it is known this group receives ground water contaminated by other waste area groups, the extent to which this group may be contributing to ground-water contamination is yet to be determined. Sampling and monitoring activities are continuing, and a Remedial Investigation work plan has been prepared.

No interim remedial actions are scheduled for Waste Area Group 2 in the immediate future, and final remediation will follow completion of remediation for upgradient waste area groups. The principal goals of remedial action are to reduce potential offsite risks by identifying and supporting efforts to clean up contaminant sources in upgradient groups and within group 2.

Interim corrective measures are, however, likely to be implemented for soils and sediments in group 2; they have been contaminated primarily with cesium-137 and cobalt-60 from

upgradient sources and have high priority for remediation. Unlike surface water or ground water, these soils and sediments are relatively stationary and do represent a significant potential source of particle-bound contaminants. Possible interim corrective actions are stabilization (e.g., by capping or adding simple erosion barriers) or removal. Another option is soil solidification by in-place vitrification.

Waste Area Group 4

Waste Area Group 4 is located in Melton Valley about 0.5 mile southwest of the Laboratory's main plant. It is associated with Solid Waste Storage Area 4, and it also contains experimental pilot pits in area 7811 and liquid low-level waste transfer lines connecting them to Storage Area 4. Solid Waste Storage Area 4 was opened in 1951 for routine burial of solid low-level radioactive waste. From 1955 to 1963, when Oak Ridge served as the burial ground from waste from the southern region, Storage Area 4 received a wide variety of poorly characterized waste (including radioactive waste) consisting of paper, clothing, equipment, filters, animal carcasses, and laboratory waste. About half of the waste was received from 50 agencies other than Oak Ridge. The waste was placed in trenches, in shallow auger holes, and in ground piles for covering at a later date.

From 1954 to 1975, liquid low-level waste was transported in underground transfer lines from storage tanks at the main plant to waste pits and trenches in Waste Area Group 7 and later to the hydrofracture facility. The Pilot Pits Area was constructed for pilot-scale studies of radioactive-waste disposal from 1955 to 1959. Three large concrete cylinders containing experimental equipment remain embedded in the ground. A control building and an asphalt pad in this area have previously been used for storage.

The major contaminants at Waste Area Group 4 are strontium-90, tritium, cesium-137, and a small amount of cobalt-60. This group is a major contributor of strontium-90 and tritium to the White Oak Creek, accounting for about 18 percent of the strontium-90 discharge observed at White Oak Dam over the past 3 years. Moreover, about 40 percent of the strontium-90 discharge from Waste Area Group 4 can be attributed to seepage from three discrete areas in which "bathtubbing" occurs in trenches: waste trenches are flooded from the subsurface during storms or high ground-water conditions, water leaches contaminants out of the waste, and contaminated water seeps into the soil at the downgradient end of the trench.

An investigation has been conducted to confirm the location and behavior of bathtubbing trenches. It is likely to be followed by an interim remedial action to hydrologically isolate the bathtubbing trenches, thereby reducing contaminant discharges. A decision and an initial design for remedial action are scheduled for FY 1995.

Waste Area Group 5

Group 5 is directly south of the Laboratory's main plant in Melton Valley. It encompasses 80 acres, approximately 60 acres of which was used for waste disposal. It consists of Solid Waste Storage Area 5, which was opened in 1959 when Solid Waste Storage Area 4 neared capacity, and surrounding land. Both the Old Hydrofracture Facility and the New Hydrofracture Facility (see the description of Waste Area Group 10) are within its boundaries.

There are two distinct geographical areas in Solid Waste Storage Area 5: Storage Area 5 North and Storage Area 5 South. The north area was used mainly for disposal of transuranic waste. From 1959 to 1963, it served as the regional burial ground for transuranic waste from the southeastern region. Before 1970, transuranic waste was buried in unlined trenches and auger holes. After 1970, retrievable

aboveground storage was required. The south area was used mainly for disposal of low-level radioactive waste. However, an unknown quantity of transuranic waste was buried in trenches and auger holes in the south area before designation of Solid Waste Storage Area 5 North as the Transuranic Waste Storage Area. Storage Area 5 was closed in 1973.

Waste Area Group 5 also includes a trench-and-dump area that is not well defined; it was used for disposal of segregated low-level radioactive waste that was contaminated with plutonium. This waste was buried in trenches and covered with a slab of concrete.

Waste Area Group 5 is a major contributor of strontium-90 and tritium to Melton Branch and the creek into which it flows, White Oak Creek. Current information shows most of these contaminants come from seepage in four discrete areas. The specific sources of the contamination are currently unknown.

To remedy contamination of White Oak Creek with strontium, an in-place treatment system for contaminated seep water was installed as an interim measure in two of the seepage areas in November 1994. The treatment is based on the use of hydrous silicate minerals (zeolite) to capture strontium.

Waste Area Group 6

Waste Area Group 6 consists of Solid Waste Storage Area 6, the emergency waste basin, and the explosives-detonation trench. Solid Waste Storage Area 6 is in Melton Valley, about 1.2 miles south of the Laboratory's main plant. Waste burials started here in 1969 and were expanded to full-scale operation in 1973, when Solid Waste Storage Area 5 was closed. Approximately 19 acres of this 68-acre site has been used for waste disposal.

Storage Area 6 has received low-level radioactive waste and chemical, biological, and mixed waste (e.g., solvents, laboratory glassware and equipment, and protective clothing). Vast improvements in disposal techniques occurred in 1986 and 1987. Disposal in unlined trenches was replaced with disposal of waste in approved containers, and criteria for waste acceptance were defined and implemented.

The emergency waste basin was constructed in 1961 for storing liquid waste that could not be discharged into White Oak Creek. The basin has a capacity of 15 million gallons, but has not been used to date. Sampling of the basin's small drainage has shown the presence of some radioactivity, but the source of this contamination is not known.

Waste Area Group 6 has low priority for remediation because it accounts for only about 2 percent of the risk due to all the contaminants discharged at White Oak Dam. An earlier decision to construct an extensive temporary closure system for this group has been abandoned. This group will, however, be monitored to determine the total annual discharges of tritium and strontium-90.

The monitoring will be directed at estimating total annual discharges from flow paths at surface water sites where monitoring gages are present, along the ungaged perimeter, and from shallow and deep ground-water systems. Future annual assessments of Waste Area Group 6 will be based on successive annual monitoring results. Resources will be directed to flow paths where the largest contaminant releases occur.

Waste Area Group 7

Waste Area Group 7 is about 1 mile south of the Laboratory's main plant area. The major sites in this Group are seven pits and trenches used from 1951 to 1966 for disposal of liquid low-level waste. Waste Area Group 7 also includes a decontamination facility, three leak sites, a storage area containing shielded transfer tanks

and other equipment, and seven fuel wells used to dispose of acid solutions primarily containing enriched uranium from Homogeneous Reactor Experiment fuel.

Early remedial actions for this group include demonstrating in situ soil vitrification and upgrading the existing cap and surface drainage to control contaminant migration from all pits and trenches. In situ vitrification involves melting the entire mass of contaminated soil into a chemically homogeneous and durable glass microcrystalline waste form. The melt dissolves and incorporates radionuclides and nonvolatile hazardous elements like heavy metals and destroys organic components. Most semivolatile organics are retained in the melt, and the small quantity of material escaping from the melt is captured and treated.

Remediation will include vitrification in waste pits, waste trenches, and auger holes drilled for the Homogeneous Reactor Experiment. Then, the site will be backfilled and capped, and a french drain will be installed. Contaminated soils at the locations of underground pipeline leaks and decontamination facility soils will be excavated, consolidated in one place, and capped. The excavated areas will be backfilled with clean soil and revegetated.

Waste Area Group 8

Waste Area Group 8 is about 0.6 mile south of the main plant. It includes the inactive Molten-Salt Reactor and the operating High Flux Isotope Reactor with associated tank and piping systems, six pipeline-leak sites and an old transfer line, five surface impoundments, a spoils area, and waste-storage facilities operated with a permit issued under the Resource Conservation and Recovery Act. Low-level liquid waste and process waste from the reactor facilities are collected in tanks and then pumped to the main plant area for storage and treatment. Surface and ground waters from Waste Area Group 8 discharge into Melton Branch. This waste area group has not been investigated. It is of low risk, and no action is planned in the immediate future.

Waste Area Group 10

Waste Area Group 10 consists of injection wells and subsurface grout sheets constructed for hydrofracturing experiments conducted in the late 1950's and 1960's. The facilities built for these experiments, the Old Hydrofracture Facility and the New Hydrofracture Facility, are located in Waste Area Group 5. The site of the first hydrofracture experiment is located within in the boundaries of Waste Area Group 7. Here, in 1959, grout consisting of diatomaceous earth and cement was experimentally injected into an underground shale formation to observe the fracture pattern created in the shale and to identify potential operating problems. The site of the second hydrofracture experiment is in Waste Area Group 8. The second hydrofracture experiment was designed to duplicate, in scale, an actual disposal operation; however, radioactive tracers were used instead of actual waste. Bentonite, cement, and water tagged with cesium-137 were used in formulating the grout.

The Old Hydrofracture Facility is about one mile southwest of the Laboratory's main plant near the southwest corner of Waste Area Group 5. Commissioned in 1963, it served as a pilot plant to demonstrate the feasibility of using hydrofracturing. The waste used in experiments contained strontium-90, cesium-137, curium-244, and other transuranic and unidentified radionuclides. The New Hydrofracture Facility was more advanced but did not operate as anticipated and is no longer used.

The New Hydrofracture Facility is 900 feet southwest of the Old Hydrofracture Facility on the south side of Melton Branch. It was constructed to replace the older facility, a pilot project, and to serve as the operational system

for disposal of liquid low-level radioactive waste at the Oak Ridge National Laboratory. The waste used in the injections were concentrated liquid low-level waste and some sludge removed from the gunite tanks; the latter contained strontium-90, cesium-137, curium-244, transuranic, and other radionuclides. Only enough liquid waste and sludge for demonstration purposes was used.

At Waste Area Group 10, samples from 23 of the existing 47 wells at the Old Hydrofracture Facility will be taken to characterize the waste and to provide data for protecting workers during the plugging of fracture wells. If deep ground-water remediation is required, a potential remedy is to plug the deep wells in Waste Area Group 10 so ground water cannot escape, monitor the grout sheets, and use computer models to predict potential effects on the deep ground-water system.

Waste Area Groups 11 and 13: External Areas

Waste Area Group 11

Waste Area Group 11, the White Wing Scrap Yard, is a largely wooded area of about 30 acres located in the McNew Hollow area on the western edge of East Fork Ridge. It is not on the Oak Ridge National Laboratory site but is on the Oak Ridge Reservation. Starting in the early 1950's, this scrap yard was used for aboveground storage of contaminated material from the Oak Ridge National Laboratory, the K-25 Site, and the Y-12 Plant. The material from the Laboratory was mainly contaminated steel tanks; trucks; earth-moving equipment; assorted large pieces of steel, stainless steel, and aluminum; and reactor cell vessels removed during cleanup of Building 3019 at the Laboratory.

The dates when the scrap was deposited at the yard are uncertain, as is the date when the yard was closed. In 1966, cleanup began by moving contaminated materials to Solid Waste Storage Area 5 and uncontaminated scrap to a commercial contractor. Cleanup continued at least into 1970, and removal of contaminated soil began in the same year. Nonetheless, some scrap metal, concrete, and other trash remain at the yard.

Numerous radioactive areas, steel drums, and polychlorinated biphenyl-contaminated soil were identified at Waste Area Group 11 during surface radiological investigations conducted during 1989 and 1990. The amount of material or contaminated soil remaining in the area is not known. Remedial actions for the White Wing Scrap Yard will include removing contaminated debris and excavating and consolidating contaminated soils and sediments from radioactive hot spots.

Waste Area Group 13

Waste Area Group 13 is a 6-acre fenced area located approximately 330 feet north of Clinch River and 1.3 miles south of the intersection of Bethel Valley Road and Tennessee State Route 95. It is not on the Oak Ridge National Laboratory site, but is on the Oak Ridge Reservation. It contains 8 cesium-137 test plots and an experimental area for the study of runoff. Each of eight test plots is 33 by 33 feet and enclosed in sheet metal extending 18 inches below the surface and 24 inches above-grade. As part of a nuclear weapons fallout experiment in 1968, Oak Ridge scientists dispersed cesium-137 fused to sand particles in into four of the eight plots. Since the water table in this area is only some 8 feet below the surface, the cesium-137 could migrate through ground water at the site. As a remedial action, soils at the site were excavated in 1993 and 1994 to a depth of 3.5 to 4 feet. Monitoring will continue to ensure the excavation reduced risks to acceptable levels.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
8ethel Valley							
Assessment	0	10	6,254	4,265	0	D	D
Remedial Actions	0	0	0	3,760	6,512	445	0
Surveillance And Maintenance	0	0	0	0	0	101	1,344
Facility Decommissioning							
Assessment	2,383	1,542	11,113	2,589	11,548	56	0
Facility Decommissioning	5,449	4,753	14,028	63,968	99,006	60,625	33,507
Ground- Water Project							
Assessment	5,448	7,353	7,462	7,461	5,948	0	0
Surveillance And Maintenance	0	0	1,260	2,293	2,314	2,291	1,969
Main Plant							
Assessment	5,753	34,309	19,132	1,941	231	0	0
Remedial Actions	10,996	34,346	10,555	2,369	460	99	0
Surveillance And Maintenance	11	59	468	1,590	4,208	8D3	154
Melton Valley							
Assessment	19,315	13,942	37,968	35,825	6,969	5,709	5,576
Remedial Actions	14,149	41,408	44,187	78,136	22,834	59	0
Surveillance And Maintenance	436	62	530	576	324	1,964	2,456
Surveillance and Maintenance Project							
Surveillance And Maintenance	5,027	4,904	4,987	4,978	3,951	0	0
Total	68,969	142,689	157,942	209,749	164,306	72,151	45,006

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
8ethel Valley								
Assessment	0	0	0	0	0	0	0	52,642
Remedial Actions	0	0	0	0	0	0	0	53,583
Surveillance And Maintenance	1,043	0	0	0	0	0	0	12,440
Facility Oecommissioning								
Assessment	0	0	0	0	0	0	0	148,540
Facility Decommissioning	4,348	598	150	0	0	0	0	1,437,606
Ground- Water Project								
Assessment	0	0	0	0	0	0	0	173,808
Surveillance And Maintenance	68D	0	0	0	0	0	0	54,034
Main Plant								
Assessment	0	0	0	0	0	0	0	312,582
Remedial Actions	0	0	0	0	0	0	0	305,123
Surveillance And Maintenance	303	117	11	0	0	0	0	38,627
Melton Valley								
Assessment	0	0	0	0	0	0	D	645,838
Remedial Actions	0	0	0	0	0	0	0	1,018,017
Surveillance And Maintenance	2,742	1,990	263	0	0	0	0	57,148
Surveillance and Maintenance Project								
Surveillance And Maintenance	0	0	D	0	0	0	0	124,259
Total	9,116	2,706	423	0	0	0	0	4,434,247

** Costs raflact a fiva-yaar average in constant 1995 dollars, axcept in FY 1995 - 2000, which is a six-yaar averaga.*

*** Total Lifa Cycla is tha sum of annuel costs in constant 1995 dollars.*

Ground-Water Program

The ground-water program focuses on investigating the extent of contamination in deep ground water and pathways by which contaminants reach the deep ground water. It is divided into two operable units: Bethel Valley and Melton Valley. The program addresses contaminant transport by ground water between and beneath contaminant sources and migration potential of contamination related to hydrofracturing (see the discussion under Waste Area Group 10). Data will be analyzed to determine the potential for ground-water inflow or outflow beneath surface-watershed divides, the role of subsidence (karst) in providing contaminant routes, the effects of subsurface retardation processes on long-term contaminant migration, the depth of potential contaminant circulation and the long-term containment of hydrofracture contaminants at depth, and the point at which ground water leaves the Oak Ridge National Laboratory site. The ground-water assessment will provide data on the nature and extent of ground-water contamination and tools for evaluating future potential risks to onsite and offsite users of ground water.

WASTE MANAGEMENT

The Oak Ridge National Laboratory generates liquid and solid low-level radioactive waste, low-level mixed waste, transuranic waste, hazardous waste, and sanitary/industrial waste. Quantities of waste generated annually are estimated at 640 cubic feet for transuranic waste, 40,000 cubic feet for liquid low-level radioactive waste, 70,000 cubic feet for solid low-level waste, 30,000 cubic feet for low-level mixed waste, 2,400 cubic feet for hazardous chemical waste, and 25 million cubic feet for sanitary waste. These waste volumes are based on FY 1993 and FY 1994 actual figures and, as such, do not include volumes of waste from

Major Waste Management Projects

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	1995-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030	Life Cycle**
Bethell Valley FFA Upgrade	2,933	0	0	0	0	0	0	17,600
Bethell Valley LLW Collection	4,183	0	0	0	0	0	0	25,100
Central Waste Verification/CVF Operations	3,367	4,680	3,000	3,000	3,000	3,000	560	106,400
FFA LLW Tank Compliance	9,617	2,140	0	0	0	0	0	68,400
Melton Valley LLW Collection	1,717	0	0	0	0	0	0	10,300
Melton Valley Storage Tank	6,483	0	0	0	0	0	0	38,900
Process Waste Treatment	3,433	0	0	0	0	0	0	20,600
Sanitary Sewer System Upgrade	1,483	0	0	0	0	0	0	8,900
TRU Processing Facility	20,383	43,000	15,400	8,600	0	0	0	457,300
TRU Technology Development	9,500	3,140	9,040	16,740	0	0	0	201.600

* Costs shown include program menagement costs with each project

** Costs reflect a five-year everege in constent 1995 dollars, except in FY 1995 - 2000, which is a six-year everege.

Note: These projects represent a subset of waste management ectivities. Associated program manegement costs ere built-in to the estimetes provided.

environmental restoration or facility stabilization activities. The Laboratory also manages the spent nuclear fuel program for the Oak Ridge Reservation.

The Oak Ridge National Laboratory served as the regional burial ground for transuranic waste from the southeastern region from 1959 to 1963 and for low-level and other hazardous waste from 1955 to 1963. These facilities are managed as an environmental restoration activity.

In the future, while waste generation is expected to effectively remain constant, changes in emphasis from waste storage to treatment and disposal are expected. The term "storage" is used to mean retrievable waste remaining within the waste management activities area. Retrieval of waste disposed in burial grounds, or otherwise previously viewed as disposed, would be subject to the outcome of the CERCLA process. Solid low-level waste will continue to be disposed onsite at Oak Ridge National Laboratory in accordance with applicable waste acceptance criteria. Additionally, offsite disposal will be pursued for remaining solid low-level waste at other DOE facilities in compliance with their waste acceptance criteria.

Treatment for low-level mixed waste will be provided through a combination of pre-treatment and treatment in existing onsite facilities and use of treatment capability to be supplied by the private sector. Transuranic waste will be treated onsite to meet the Waste Isolation Pilot Plant waste acceptance criteria for disposal at that facility.

Waste Treatment

Treatment systems will be designed to support disposal, assuming the applicable waste acceptance criteria are available. Where available and cost-effective, the use of private-sector capabilities will take precedence over the construction of capital facilities at the Laboratory's site.

Treatment activities are focused around the operation of liquid-waste collection, transfer, and treatment systems, as well as the provision of capability to treat transuranic waste. The majority of liquid radioactive waste is treated via conventional technologies for discharge through a National Pollutant Discharge Elimination System permitted outfall. The remaining liquid waste is routinely solidified to extend the operating life of storage tanks. The Laboratory is collaborating with the Office of Environmental Management's Technology Development program to develop and implement needed treatment capabilities for liquid waste and sludge.

The current waste-treatment facilities at the Laboratory include systems for collection, transfer, treatment, and storage or discharge of liquid radioactive waste; collection, transfer and treatment of radioactive gaseous waste; and utilization of the Toxic Substances Control Act Incinerator for low-level mixed waste treatment. Liquid radioactive waste is collected in storage tanks and routed through underground transfer lines to central evaporators for concentration. The concentrate is sent to the Melton Valley Storage Tanks for storage; condensate is sent to the Process Waste Treatment Plant for further treatment prior to release. Radioactive gaseous waste collected from multiple laboratory facilities are filtered, sampled, monitored, and released to the atmosphere via a 250-foot stack. Low-level mixed waste meeting Toxic Substances Control Act Incinerator or other on-reservation waste acceptance criteria is treated onsite.

To replace the existing aged facilities, a new Process Waste Treatment Facility has been proposed. It will use ion-exchange media, a highly effective method for radioisotope removal. This processs will significantly reduce

secondary waste streams, principally liquid low-level waste, and lessen storage demands in the Melton Valley Storage Tanks. Construction is scheduled to start in FY 1998, and startup is expected in FY 2000.

The Laboratory has the lead for the Oak Ridge Reservation to identify and implement needed capability for characterization, storage, retrieval, and repackaging of transuranic waste. Waste packages leaving this facility will be certified to meet the waste acceptance criteria of Waste Isolation Pilot Plant for disposal. To this end, the Laboratory is proposing a transuranic processing facility. This proposed facility replaces the Waste Handling and Packaging Plant proposed earlier. The facility will be able to accept transuranic waste from other sites and certify the waste packages to the Waste Isolation Pilot Plant Waste Acceptance Criteria. As a funded 1998 line item, the Transuranic Waste Processing Facility could begin shipments about FY 2005, assuming the Waste Isolation Pilot Plant activities proceed as planned.

The sanitary waste system is currently being upgraded to provide improvements in collection and transfer system upgrades. These upgrades will meet the provisions of the Clean Water Act, as specified in the Laboratory's National Pollutant Discharge Elimination System permit.

Waste Storage

Storage activities involve ensuring all requirements of the process are met. These include verification of compliance with acceptance criteria. Depending on surface dose, solid low-level waste is retrievably stored in aboveground or below grade facilities at Oak Ridge National Laboratory or transported to K-25 Site for storage in former process buildings. Based on surface dose, transuranic waste is classified as either contact-handled or remote-handled and stored in specially procured containers in metal buildings or protected bunkers.

Spent nuclear fuel is currently stored underwater. Future spent fuel storage may include dry, aboveground facilities. Low-level mixed waste storage includes classifying, packaging, collecting, and transporting waste in accordance with applicable regulations. Sufficient resources must be available to ensure waste in 90-day accumulation areas is collected within the allotted time. Once placed in storage facilities, routine daily, weekly and monthly inspections of stored waste and storage facilities occur. Additional activities include repackaging or overpacking damaged or failed waste containers, repackaging stored waste to meet regulatory requirements, and maintaining waste-storage information. Repackaging and batching operations are conducted to better utilize storage space and to segregate non-compatible waste.

The agreement with EPA and the State of Tennessee under the Federal Facility Compliance Act requires the Laboratory to upgrade tank systems used to store liquid low-level radioactive waste and low-level mixed waste. Secondary containment, materials compatibility, leak detection, and cathodic protection are some of the requirements. Several major projects have been implemented to provide the upgrades. They pertain to low-level liquid waste collection and transfer systems at Melton Valley and Bethel Valley.

To meet expected requirements for nondestructive assay and examination, the Central Waste Verification Facility is being pursued for solid low-level waste and contact-handled transuranic waste for the Oak Ridge Reservation after FY 2000. Upgraded verification capability is required to facilitate waste treatment, storage and disposal,

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Transuranic Waste	55,487	57,812	26,034	26,034	27,548	27,608	26,421
Low-Level Mixed Waste	2,240	3,189	3,189	3,189	3,336	3,850	3,492
Low-Level Waste	2,226	12,612	12,660	12,660	12,660	10,533	1,718
Storage and Handling							
Spent Nuclear Fuel	6,313	160	2,560	0	0	0	0
Transuranic Waste	12,866	53,017	39,337	19,342	19,471	19,663	18,088
Low-Level Mixed Waste	648	3,873	4,560	4,491	4,760	5,579	4,206
Low-Level Waste	6,787	3,882	3,702	3,702	4,166	4,862	225
Disposal							
Low-Level Waste	1,072	6,589	9,740	9,775	9,779	8,578	3,152
Hazardous Waste	6,239	5,931	5,976	5,952	5,956	5,939	5,931
Sanitary Waste	4,201	4,000	4,000	4,000	4,000	4,000	4,000
Other							
Waste Management T/S/D	16,160	15,360	15,360	15,360	15,360	15,360	15,360
Total	114,240	166,425	127,119	104,506	107,037	105,971	82,592

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Transuranic Waste	23,230	9,790	834	0	0	0	0	1,459,478
Low-Level Mixed Waste	3,208	2,615	252	0	0	0	0	145,039
Low-Level Waste	476	329	27	0	0	0	0	331,733
Storage and Handling								
Spent Nuclear Fuel	0	0	0	0	0	0	0	51,475
Transuranic Waste	16,989	14,002	2,006	0	0	0	0	1,086,770
Low-Level Mixed Waste	2,833	2,346	784	83	0	0	0	171,464
Low-Level Waste	225	255	300	0	0	0	0	147,316
Disposal								
Low-Level Waste	50	33	27	16	8	4	1	245,188
Hazardous Waste	5,929	5,929	4,743	0	0	0	0	298,862
Sanitary Waste	4,000	4,000	3,200	0	0	0	0	201,208
Other								
Waste Management T/S/D	15,360	12,288	0	0	0	0	0	696,001
Total	72,298	51,588	12,172	99	8	4	1	4,834,533

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

assuming greater utilization of offsite disposal and private sector capability and increases in waste expected from environmental restoration activities.

Waste Disposal

All spent fuel will be eventually shipped away for disposal in a geologic repository. The repository location is assumed to be Yucca Mountain in Nevada. Disposal at the Oak Ridge National Laboratory is limited to solid low-level waste. This waste is disposed at the Interim Waste Management Facility, the only operating low-level-waste disposal unit on the Oak Ridge Reservation. The facility, located at Solid-Waste Storage Area 6, uses abovegrade, tumulus-type facilities. Tumulus disposal provides greater isolation of waste from the environment, significantly decreasing the potential for contaminant release from the site. Waste is placed in metal boxes measuring 4 feet by 4 feet by 6 feet. Each box is then placed in a concrete vault with only slightly larger dimensions. The void space between the box and the vault is filled with grout. Filled vaults are then placed onto engineered, reinforced concrete pads. Each pad accommodates approximately one year's worth of waste generation. When pads are filled, they are covered with a multilayer cap to prevent or reduce infiltration of water through the waste. Leachate collection and monitoring is provided for each pad. All waste placed on the pad meet the Interim Waste Management Facility waste acceptance criteria for disposal.

All spent nuclear fuel will eventually be shipped away for disposal in a geologic repository. The repository location is assumed to be Yucca Mountain in Nevada. Disposal operation activities involve ensuring waste acceptance criteria are met and collecting, staging, inspecting, nondestructively examining, compacting, and finally disposing of waste. Hazardous chemical waste and low-level mixed waste are shipped to offsite facilities for disposal. This effort is coordinated through central Oak Ridge Reservation initiatives.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The facility stabilization and maintenance process began at the Oak Ridge National Laboratory in 1995. Of the 88 Oak Ridge

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Nuclear Material and Facility Stabilization	13,655	11,670	15,827	5,296	1,665	2,162	2,466	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Nuclear Material and Facility Stabilization	5,958	47	0	0	0	0	0	307,385

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

National Laboratory facilities slated to undergo this process, 19 have already begun stabilization. They include contaminated storage tanks and ancillary facilities of the Bulk Shielding Reactor. It is assumed stabilization for the remaining 69 facilities will start in 1996. These facilities include the Oak Ridge National Laboratory Graphite Reactor, the Bulk Shielding Reactor Facility, the Oak Ridge Research Reactor, the High Flux Isotope Reactor, the DOSAR Facility, the Superconductivity Laboratory, the Health Physics Research Reactor, and the Low Intensity Test Reactor. The resulting waste types will include: low-level transuranic, low-level mixed, and hazardous. This report arbitrarily assumes the stabilization and maintenance process at the Oak Ridge National Laboratory will be completed by 2037.

LANDLORD FUNCTIONS

The Department of Energy's Office of Energy Research is the landlord for the Oak Ridge National Laboratory.

PROGRAM MANAGEMENT

Program management, through the technical integration and contract-management functions, provides essential technical support, administrative integration, and oversight to environmental restoration and waste management. This support is aimed at ensuring proper identification, characterization, remediation, and revitalization of contaminated sites. It includes technical programs, technical oversight, community relations, the integration of environmental restoration with waste management, and business management.

Included in program management is financial funding for the State of Tennessee to support its independent monitoring and oversight of activities and facilities as outlined in the Agreement-In-Principle with the State.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Oak Ridge National Laboratory.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	20,472	66,278	58,677	40,997	32,463	51,857	42,108	

	2035	3040	2045	2050	2055	2060	2065	Life Cycle**
Program Management	29,546	18,686	3,355	25	2	1	0	1,842,801

** Costs reflect a five-year everege in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.,*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	0	0	0	0	0	0	0
Waste Management	99,389	144,790	110,593	90,920	93,122	92,195	71,855
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0
Program Management	17,606	56,999	50,462	35,257	27,919	44,597	36,213
Total	116,994	201,789	161,055	126,177	121,040	136,792	108,068

	2035	2040	2045	2050	2055	2060	2065	Life Cycle
Environmental Restoration	0	0	0	0	0	0	0	0
Waste Management	62,900	44,881	10,590	86	7	3	1	4,206,043
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	0
Program Management	25,409	16,070	2,886	21	2	1	0	1,584,809
Total	83,826	60,951	13,476	107	9	4	1	5,790,852

** Costs reflect e five-yeer everage in constent 1995 dollers, except in FY 1995 - 2000, which is e six-yeer average.*

*** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	68,969	142,689	157,942	209,749	164,306	72,151	45,006
Waste Management	14,851	21,635	16,525	13,586	13,915	13,776	10,737
Nuclear Material and Facility Stabilization	13,655	11,670	15,827	5,296	1,665	2,162	2,466
Program Management	2,866	9,279	8,215	5,740	4,545	7,260	5,895
Total	100,341	185,273	198,510	234,370	184,430	95,349	64,104

	2035	2040	2045	2050	2055	2060	2065	Life Cycle
Environmental Restoration	9,116	2,706	423	0	0	0	0	4,434,247
Waste Management	9,399	6,706	1,582	13	1	0	0	628,489
Nuclear Material and Facility Stabilization	5,958	47	0	0	0	0	0	307,385
Program Management	4,136	2,616	470	3	0	0	0	257,992
Total	28,609	12,075	2,475	16	1	1	0	5,628,113

** Costs raflact a fiva-yaar avaraga in constant 1995 dollars, axcapt in FY 1995 - 2000, which is a six-yaar avaraga.*

*** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	WAG 1 Tank Content Removal - Complete Construction	1995
	WAG 1 North and South Tank Farms - Interim Action Complete	1995
	WAG 5 Seeps - Interim Action Complete	1995
	WAG 6 Monitoring and Operations - Interim Action Complete	1995
	WAG 7 Remediation - Interim Action Complete	1995
	WAG 11 Remediation - Interim Action Complete	1995
	WAG 2 EA Hot Sediment Stabilization - Interim Action Complete	1997
	Waste Evaporator Facility - Bldg. 3506 - Complete Decommissioning	1997
	Fission Product Pilot Plant - Bldg. 3515 - Complete Decommissioning	1998
	WAG 10 (OHF) Wells - Interim Action Complete	2000
	Old Hydrofracture Facility - Bldg. 7852 - Complete Decommissioning	2001
	WAG 1 Surface Impoundments - Complete Remediation	2002
	WAG 1 Corehole 8 - Complete Remediation	2006
	WAG 5 OU - Complete Remediation	2007
	WAG 1 Underground Piping Storm Drain OU - Complete Remediation	2009
	WAG 4 Seeps - Interim Action Complete	2010
	WAG 1 Ground water OU - Complete Remediation	2010
	WAG 1 North and South Tank Farms - Complete Remediation	2010
	WAG 10 Remedial Investigation/P&A - Complete Construction	2010
	Metal Recovery Facility - Bldg. 3505 - Complete Decommissioning	2012
	Coolant Salt Facility - Bldg. 9201-3- Complete Decommissioning	2015
	Oil Storage Tanks - 9201-3 Complete Decommissioning	2015
	WAG 1 Contaminated Soils OU - Complete Remediation	2015
	Molten Salt Loop - Bldg. 9201-3- Complete Decommissioning	2015
	Shielded Transfer Tanks - Complete Decommissioning	2015
	Decontamination Facility - Bldg. 9419-1 - Complete Remediation	2015
	WAG 1 White Oak Creek Floodplain Soils/Sed. OU - Complete Remediation	2015
	WAG 10 - Complete Remediation	2015

Major Activity Milestones (cont'd)

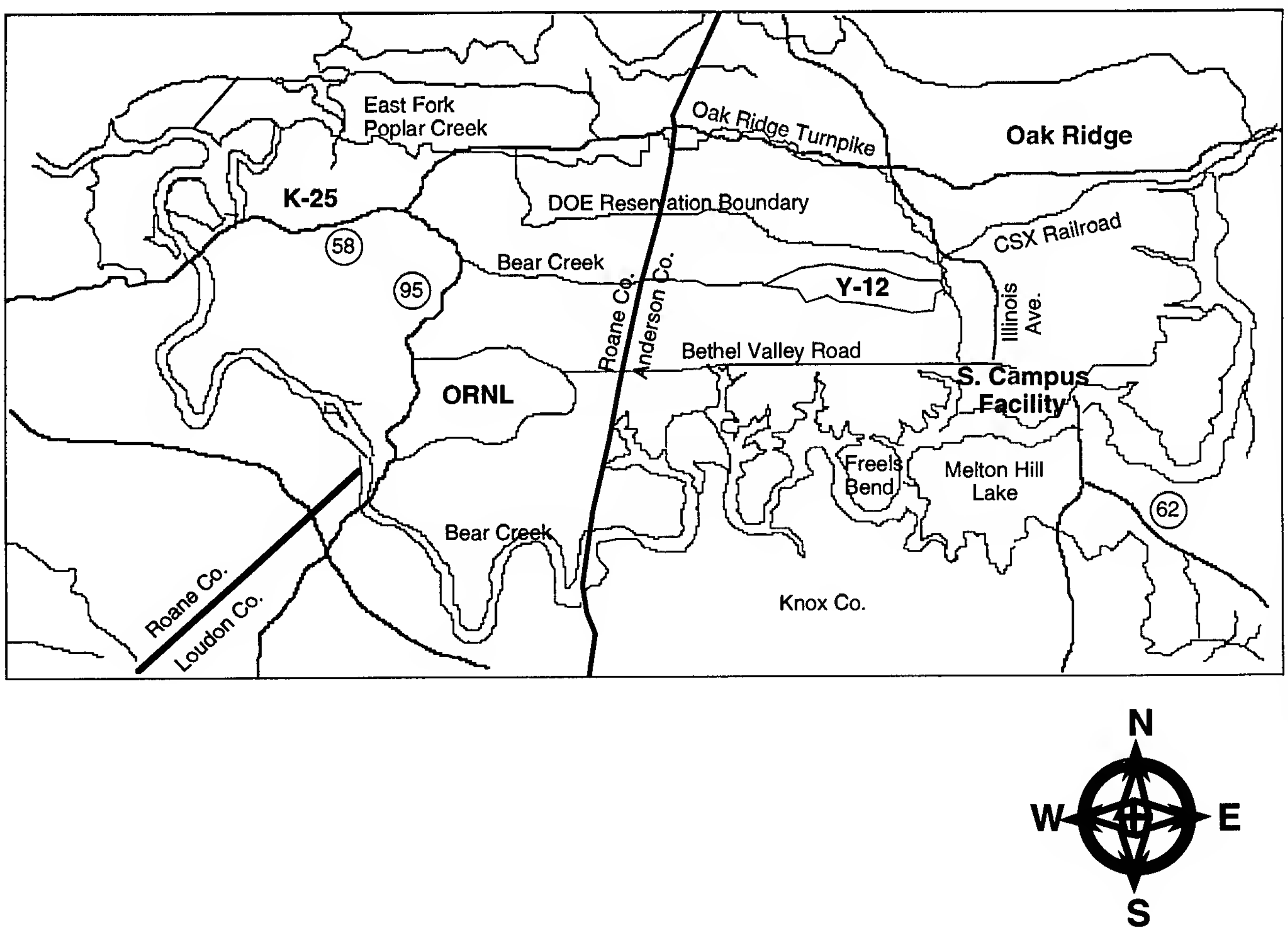
ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration (cont'd)		Fiscal Year
	WAG 1 Steel Tank Systems OU - Complete Remediation	2015
	WAG 11 Remediation - Complete Remediation	2016
	WAG 2 RI - Complete Remediation	2020
	WAG 9 Remediation - Complete Remediation	2020
	Homogeneous Reactor Experiment - Bldg. 7500 - Complete Remediation	2020
	WAG 8 Remediation - Complete Remediation	2020
	WAG 4 Remediation - Complete Remediation	2020
	Graphite Reactor - Bldg. 3001 - Complete Decommissioning	2021
	WAG 7 Remediation - Complete Remediation	2020
	Fission Product Development Lab - Bldg. 3517 - Complete Decommissioning	2021
	Low Intensity Test Reactor - Bldg. 3005 - Complete Decommissioning	2025
	WAG 3 Remediation -Complete Remediation	2025
	WAG 1 SWSA 1 OU - Complete Remediation	2025
	High Level Chem Development Lab - Bldg. 3005 - Complete Decommissioning	2030
	Molten Salt Reactor - Bldg. 7503 - Complete Decommissioning	2030
	Oak Ridge Research Reactor - Bldg. 3042 - Complete Decommissioning	2030
	Complete all Environmental Restoration activities	2045
Nuclear Material and Facility Stabilization		Fiscal Year
	ORNL WAG 1 - Stabilization	2010
	Complete all Stabilization Activities	2040
Waste Management		Fiscal Year
	Complete Construction of LLLW Collection and Transfer System for Bethel Valley (Phase 1)	1994
	Complete Construction of LLLW Collection and Transfer System for Melton Valley	1996
	Complete Construction of Melton Valley Storage Tank Capacity Increase	1998
	Complete Construction of Bethel Valley FFA Upgrade	1999
	Complete all Waste Management Activities	2045

For further information on this site, please contact:

Public Participation Office	*(615) 576-1590*
Public Affairs Office	*(615) 576-0885*
Technical Liaison: John Sweeney	*(615) 576-5904*
Mac Roddye	*(615) 576-1801*

OAK RIDGE RESERVATION OFFSITE PROGRAM

The Clinch River and Watts Bar Reservoir; the flood plain of the Lower East Fork Poplar Creek; two privately owned sites in Knoxville, Tennessee; and three privately owned sites in Oak Ridge, Tennessee, have been contaminated with hazardous materials from operations at the Oak Ridge Reservation and other sources. The Clinch River and Watts Bar Reservoir system, which encompasses 120 river miles in length and 44,000 acres in surface area, is used for municipal and industrial water supplies, sport fishing, boating, swimming, tourism, and residential development. The Lower East Fork Poplar Creek begins at Lake Reality (outside the east end of the Y-12 Plant of the Oak Ridge Reservation) and flows for 14 miles through residential, commercial, agricultural, and open-use areas in the City of Oak Ridge. Environmental restoration at these sites is addressed by the Oak Ridge Reservation Offsite Program.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	14,300	12,400	18,100	15,000	31,400	25,600
Program Management	1,400	2,000	3,200	3,200	6,800	3,900
Total	15,700	14,400	21,300	18,200	38,200	29,500

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997 - 2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	17,996	14,349	8,450	8,140	5,652	1,650	1,546
Program Management	2,236	2,647	1,460	1,516	1,307	375	334
Total	20,232	16,996	9,910	8,656	6,959	2,025	1,880

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	1,310	1,332	0	0	0	0	0	319,512
Program Management	253	297	0	0	0	0	0	54,361
Total	1,563	1,629	0	0	0	0	0	373,873

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT AND FUTURE MISSIONS

The mission of the Oak Ridge Reservation Offsite Program is to evaluate and, if necessary, remediate contamination at the subject sites. This will be accomplished under the Oak Ridge environmental restoration program, which began in October 1989.

The Clinch River environmental restoration program is a part of the Oak Ridge Reservation Offsite program. It addresses the transport of waterborne contaminants beyond the boundaries of the Oak Ridge Reservation. Primary areas of investigation include Melton Hill Reservoir, the Clinch River from Melton Hill Dam to its confluence with the Tennessee River, the White Oak Creek Embayment, and the Watts Bar Reservoir.

Most of the properties included in the offsite program are owned by private individuals or organizations intending to maintain ownership. Although some of the Lower East Fork Poplar Creek is on property owned by the Department of Energy (DOE), it is considered to be waters of the State of Tennessee.

ENVIRONMENTAL RESTORATION

Much of the contamination at the river sites was transported from Oak Ridge Reservation facilities by three tributaries of the Clinch River: the White Oak Creek, the Bear Creek, and the Lower East Fork Poplar Creek. Many different contaminants are present, ranging from radionuclides to heavy metals and organic chemical compounds. The contamination resulted not only from operations at the Oak Ridge Reservation but also from industrial, urban, and residential activities as well as agricultural runoff.

The Clinch River and Watts Bar Reservoir

The Clinch River and Watts Bar Reservoir is included in the National Priorities List of contaminated sites. The contaminants include metals (mercury, lead, arsenic, selenium, and chromium); organic compounds (polychlorinated biphenyls, (PCBs) dioxin, and chlordane); and radionuclides (cesium-137, cobalt-60, tritium, and strontium-90). The cesium-137 is found in deep sediments within the channel. PCBs are present in fish, but DOE operations are not the only source of the PCBs. The Clinch River and Watts Bar Reservoir receives effluents from facilities at the Oak Ridge Reservation as well as effluents from municipal and industrial water-treatment plants and runoff from agricultural, urban, and residential areas.

Monitoring the condition of the Clinch River and Watts Bar Reservoir will continue through FY 2000 to permit a long-term assessment of the effectiveness of remediation of the Oak Ridge Reservation. The first phase of the characterization of the Clinch River/Watts Bar Reservoir system has been completed, and phase II is ongoing. The record of decision will be in two parts, with the record of decision for the Lower Watts Bar Reservoir expected in FY 1995 and the record of decision on the Clinch River/Poplar Creek expected in FY 1997. It is assumed the Lower Watts Bar Reservoir will require no further action. The assumed final actions for the Clinch River/Watts Bar Reservoir system will be institutional controls and a long-term assessment of effectiveness of remediation at the Oak Ridge Reservation. The institutional controls and monitoring are assumed to continue until at least FY 2019.

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	17,996	14,349	8,450	8,140	5,652	1,650	1,546

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	1,310	1,332	0	0	0	0	0	319,512

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Lower East Fork Poplar Creek

The Lower East Fork Poplar Creek flows 14 miles through residential, commercial, agricultural, and open-use areas in the City of Oak Ridge. This remediation site is on the National Priorities List. The principal contaminants of concern are mercury and mercury compounds. The contaminants in the flood plain of the creek include heavy metals, radionuclides, PCBs, and polychlorinated hydrocarbons from past operations at DOE's Y-12 Plant. Other contaminants are present in the sediments.

The assumed remedial action is the clearing of land; removal of soils contaminated with mercury; and land restoration including planting trees, installing riprap, seeding, and mulching. The cleared trees from the site will be chipped and used for backfill, and the trunks will be transported to the construction landfill of the Y-12 Plant for disposal. Debris and contaminated soils will be transported to a disposal unit that the Department will build at the Y-12 Plant. In addition, surveillance and monitoring will be performed regularly after remediation is complete.

The characterization and the Feasibility Study have been completed for the Lower East Fork Poplar Creek, and the record of decision is expected in FY 1996. Remediation is scheduled to be completed in FY 2005.

Unregulated Projects

The unregulated projects in the Oak Ridge Reservation Offsite Program are five privately owned sites. They are referred to as unregulated because they are not conducted under the Federal Facility Compliance Act and are not regulated by the Comprehensive Environmental Response, Compensation and Liability Act or the Resource Conservation and Recovery Act. However, the Department has entered into agreements with the State of Tennessee to remediate these properties to the extent of its responsibility.

The unregulated projects consist of the site of the Atomic City Auto Parts in Oak Ridge; a railspur owned by CSX Transportation, Inc., in Oak Ridge; the Solway drums site in Knoxville; a sewage digester owned by Western Sewage in Oak Ridge; and the David Witherspoon, Inc. site in Knoxville.

Atomic City Auto Parts in the past received surplus government materials from the Oak Ridge Reservation facilities operated by DOE and its predecessor agencies. It is an auto salvage yard. The site is privately owned and operated and is listed as a Tennessee Superfund site. Studies at Atomic City Auto Parts have detected the presence of heavy metals, solvents, PCBs, organic chemicals dioxin and furan, and radioactive materials. The site is currently regulated under a consent order between the Tennessee Department of the Environment and Conservation and DOE. The order calls for a two-phase cleanup action involving constructing support facilities for the second phase of remedial action and removal of contaminated materials, which will be sent to the K-25 Site at the Oak Ridge Reservation for disposal. The first phase of the Atomic City Auto Parts cleanup action is completed. The completion of phase II is scheduled for FY 2001.

The Solway drums site is a privately owned site in a rural residential area in Knox County. Its owner had improperly stored some 265 drums of various oils and solvents reportedly purchased from the Union Carbide Corporation when Union Carbide was manager of the Oak Ridge Reservation. The presence of these drums at Solway was reported to DOE on January 10, 1994. The drums, along with 66 boxes of soil excavated from the area where the drums had leaked, were shipped to the K-25 Site by the Tennessee Department of the Environment and Conservation. Their contents

had been characterized only for shipping purposes. The waste was placed in interim storage pending complete characterization. The waste has been transferred into compliant storage now that characterization has been completed. The costs for final disposal will be included within the waste management activity at the K-25 Site.

The Western Sewage digester was part of the sewage-treatment system serving the Y-12 Plant and the west side of the City of Oak Ridge from 1942 until it was decommissioned in 1982. A preliminary analysis of liquid samples found uranium and low levels of cesium-137 and cobalt-60. The Department has agreed to assist the City of Oak Ridge by conducting a characterization of the digester contents to identify proper disposal. The contents of the digester will be passed through the city's waste-treatment system, and it is assumed the level of contamination in solids from the digester will be non-existent or so low they can be landfarmed like the other solids from the treatment system. The concrete walls and floor inside the digester are assumed not to have contaminant levels warranting removal from the site. Characterization to determine the true situation has been started.

David Witherspoon Inc., an industrial site, accepted scrap metal and other materials from many sources. Several of these materials are alleged to have originated from facilities owned by the Department. Some of the scrap metal at the site is contaminated with radionuclides. The David Witherspoon site is listed as a Tennessee Superfund site and is subject to State Superfund regulations. On December 1, 1992, the Department signed an agreed consent order for this site; subsequently the Department removed the contaminated material and transferred it to the K-25 Site in Oak Ridge for disposal. Further action is required on this site. The Department is negotiating an agreement with the State to establish deliverables and schedules.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration							
Assessment	1,275	0	0	0	0	0	0
Remedial Actions	11,965	4,281	0	0	0	0	0
Surveillance And Maintenance	4,956	10,068	8,450	8,140	5,652	1,650	1,546
Total	17,996	14,349	8,450	8,140	5,652	1,650	1,546

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration								
Assessment	0	0	0	0	0	0	0	7,650
Remedial Actions	0	0	0	0	0	0	0	93,197
Surveillance And Maintenance	1,310	1,332	0	0	0	0	0	219,279
Total	1,310	1,332	0	0	0	0	0	320,126

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

The preceeding table presents estimated costs of environmental restoration. A more detailed tabulation by remedial activity is given in following funding and cost information sections.

WASTE MANAGEMENT

Waste management for the Oak Ridge Reservation Offsite Program is funded within the scope of environmental restoration activites. Generally, waste generated by remediation will be shipped to the K-25 Site at the Oak Ridge Reservation for storage or to commercial facilities for treatment or disposal. Costs for managing this stored waste at K-25 and for treatment and disposal of the waste will be included within waste management activity at the K-25 Site since it will have become K-25's responsibility.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no nuclear material and facility stabilization activities in the Oak Ridge Reservation Offsite program.

LANDLORD FUNCTIONS

The Oak Ridge Reservation Offsite program is not responsible for landlord or infrastructure functions other than those required for environmental restoration.

PROGRAM MANAGEMENT

Program management provides for prime-contractor support to the environmental restoration program. Financial funding is also provided for the State of Tennessee to support its independent monitoring and oversight of Department of Energy facilities as outlined in an agreement with the State. Program management also provides essential technical support, administrative integration, and oversight services to ensure proper identification, characterization, remediation, and revitalization of contaminated sites. These support areas include technical programs, technical oversight, community relations, analytical projects, integration of the management activities for waste generated in environmental restoration, and business management.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for the Oak Ridge Reservation Offsite program.

Program Management Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	2,236	2,647	1,460	1,516	1,307	375	334	6,067

	2035	2040	2045	2050	2055	2060	2065	Life Cycle
	253	297	0	0	0	0	0	54,361

* Costs reflect e five-yeer everege in constent 1995 dollars, except in FY 1995 - 2000, which is a six-year everege.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	12,435	9,621	3,495	3,187	1,710	1,650	1,546
Program Management	1,667	1,939	873	895	803	347	313
Total	14,112	11,560	4,369	4,082	2,513	1,997	1,859

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	1,310	1,332	0	0	0	0	0	193,256
Program Management	253	297	0	0	0	0	0	38,652
Total	1,562	1,629	0	0	0	0	0	231,908

* Costs reflect e five-year everege in constant 1995 dollers, except in FY 1995 - 2000, which is e six-yeer everege.

** Totel Life Cycle is the sum of ennual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	5,561	4,728	4,955	4,953	3,942	0	0	126,256
Program Management	559	709	587	622	505	28	22	15,709
Total	6,120	5,437	5,541	5,575	4,447	28	22	141,966

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Major Activity Milestones

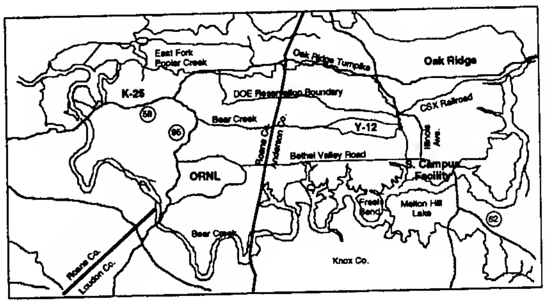
ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Solway Drums Site - Interim Action Complete	1995
	Atomic City Auto Parts, Phase II - Interim Action Complete	1995
	Lower East Fork Poplar Creek OU - Remediation Complete	2005
	Atomic City Auto Parts - Remediation Complete	2001
	Complete all Environmental Restoration Activities	2040

For further information on this site, please contact:

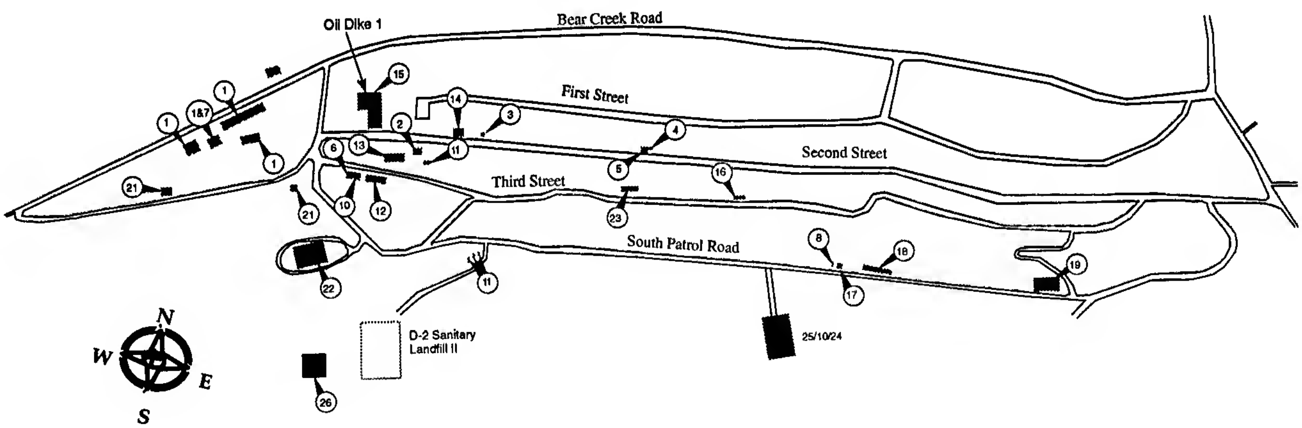
For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Marianne Heiskell	*(615) 576-0314*

OAK RIDGE Y-12 PLANT

The Oak Ridge Y-12 Plant occupies 811 acres in the Bear Creek Valley, about 2 miles from downtown Oak Ridge, Tennessee.



Y-12 WASTE MANAGEMENT SITE



MAP # & NAME
1. West End Treatment Facility (WETF) and West Tank Farm
2. Uranium Chip Oxidation Facility
3. Waste Coolant Processing Facility
4. Central Pollution Control Facility
5. Plating Rinsewater Treatment Facility (PRTF)
6. Waste Feed Preparation Facility (9401-4)
7. Groundwater Treatment Facility
8. Sludge Handling Facility

MAP # & NAME
9. Industrial Waste Compaction Facility
10. Waste Material Preparation Facility
11. Uranium Oxide Storage Vaults
12. RCRA Staging & Storage Facility
13. Classified Waste Storage
14. Waste Oil/Solvent Storage/Organic Liquid Storage Area #7
15. Contaminated Scrap Metal Storage (CSMS)
16. PCB Waste Storage

MAP # & NAME
17. Low-Level Waste Storage Area
18. Containerized Waste Storage Area (CWSA)
19. East Chestnut Ridge Waste Pile (ECRWP)
20. Organic Liquid Storage Area
21. Construction Spoil Area I
22. Industrial Landfill IV (ILF IV)
23. Mixed/PCB Waste Storage
24. Sanitary/Industrial Waste Baler
25. Landfills V & VII
26. Landfills VI

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	32,400	30,900	55,000	59,200	71,500	75,400
Waste Management	41,400	55,700	56,600	61,200	106,000	109,700
Nuclear Material and Facility Stabilization	150	27,400	27,400	27,400	37,160	37,160
Program Management	3,300	5,000	9,800	12,900	15,500	11,400
Total	77,250	119,000	148,800	160,700	230,160	233,660

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997 - 2000 reflect Budget Shortfall Scenario, costs for sheded erea assume 3% annuel inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	49,498	64,538	61,101	58,370	38,705	66,877	28,884
Waste Management	65,607	52,518	52,242	51,943	52,152	53,132	46,628
Nuclear Material and Facility Stabilization	9,988	37,621	42,995	13,245	0	0	0
Program Management	16,086	25,168	22,920	19,892	17,168	49,753	28,906
Total	141,179	179,345	179,258	143,450	108,025	169,752	104,418

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	6,995	3,363	1,997	19,045	18,310	0	0	2,137,912
Waste Management	44,074	38,257	1,536	331	248	203	17	2,360,044
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	529,236
Program Management	21,036	9,564	384	83	62	51	4	1,071,466
Total	72,105	51,184	3,917	19,459	18,620	254	21	6,098,658

** Costs reflect a five-year everage in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year average.

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

Built in 1943 as part of the Manhattan Project, the Y-12 Plant was established to separate uranium isotopes by an electromagnetic process. When the process was discontinued after World War II, the Y-12 Plant role changed to manufacturing nuclear weapons components and developmental engineering. At present, the Y-12 Plant is adjusting to new programmatic changes while maintaining safe and reliable nuclear weapons processing technologies of national importance. Its current role includes nuclear weapons component disassembly and material storage; serving as a key manufacturing technology center for the development and demonstration of unique materials, components, and services; and transferring technologies developed for highly specialized military purposes to support commercial manufacturing industries. The

mission of the Y-12 Plant is assumed to remain the same for the foreseeable future, although some surplus facilities and areas may be turned over to Environmental Management.

After the various contaminated areas at the plant have been cleaned up, they will still require institutional controls over their use; many sites will not have any future use (e.g., burial grounds with an engineered cap). Some of the surplus facilities, once they have been decommissioned, could be used for other industrial uses, most likely by the Department of Energy (DOE). The ultimate use of the site is yet to be decided. However, the requirement for long-term surveillance, maintenance, and institutional controls will limit future uses of the site.

ENVIRONMENTAL RESTORATION

The Y-12 Plant contains many facilities used for the treatment, storage, or disposal of hazardous and radioactive materials. Altogether, 217 waste management units, consolidated into operable units, have been identified here. Examples include landfills, incinerators, storage areas, aboveground and underground tanks, surface impoundments, and treatment plants. The units are under investigation to determine whether remediation is required and, if so, the best technology for the remediation. In order of increasing mobility, the contaminants present at the Y-12 Plant are metals, radionuclides, volatile organic compounds, and nitrates.

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Bear Creek	5,705	3,763	2,869	1,181	164	1,516	551
Building 9201-4	27,833	37,740	38,760	19,402	0	0	0
Chestnut Ridge	2,114	9,284	938	384	0	0	0
Plant Upper East Fork Poplor Creek	9,392	8,742	6,754	8,035	11,796	27,508	14,857
Sitewide Activities	4,413	4,978	11,358	7,429	9,018	23,389	8,472
Y-12 Decommissioning Focilities	40	32	422	21,939	17,727	14,463	5,004
Total	49,498	64,538	61,101	58,370	38,705	66,877	28,884

	2035	2040	2045	2050	2055	2060	2065	Life Cyde**
Bear Creek	146	1,569	1,997	845	110	0	0	107,792
Building 9201-4	1,849	1,793	0	18,200	18,200	0	0	846,721
Chestnut Ridge	0	0	0	0	0	0	0	65,718
Plant Upper East Fork Poplor Creek	0	0	0	0	0	0	0	444,811
Sitewide Activities	0	0	0	0	0	0	0	349,698
Y-12 Oecommissioning Focilities	5,000	0	0	0	0	0	0	323,172
Total	6,995	3,363	1,997	19,045	18,310	0	0	2,137,912

** Costs raflact a fiva-yaar avaraga in constant 1995 dollars, excapt in FY 1995 - 2000, which is a six-yaar avarage.*

*** Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

Significant progress has been made at the Y-12 Site in environmental restoration. All but one of 10 units with interim status under the Resource Conservation and Recovery Act (RCRA) have been closed. These units are four surface impoundments and five land-based units. In addition, considerable work has been conducted to isolate and reroute mercury-contaminated underground drainage.

The waste management units have been consolidated into three hydrologic or geographical units: the Chestnut Ridge hydrologic region, the Bear Creek Valley group, and the Upper East Fork Poplar Creek.

Chestnut Ridge Hydrologic Region

The Chestnut Ridge hydrologic region consists of several operable units. A series of trenches in this region were used for the disposal of hazardous chemical waste until 1984 and nonhazardous waste disposal until 1988. These practices have affected the ground water. In addition, the settling basin of the coal-ash pond filled up with sediments and overflowed into McCoy Branch. From 1967 to 1989, coal ash was transported by waters of the McCoy Branch to Rogers quarry.

Remedial action on Chestnut Ridge sites will consist of collecting and transporting contaminated ground water from waste trenches to treatment facilities at the Y-12 Plant. For the filled coal-ash pond, stabilization with surface-water rerouting is the recommended option for remediation. These activities are to be completed in 2005. Existing data indicates the Rogers quarry poses very little risk and will be monitored without any planned remediation unless monitoring data changes significantly.

The Bear Creek Valley Region

The Bear Creek Valley grouping consists of the S-3 ponds, four unlined surface impoundments containing effluent contaminated with nitrates, uranium and lesser concentrations of heavy metals and organic solvents, oil-retention ponds, an oil "landfarm," waste burial grounds and a site used for a boneyard and burnyard; two spoil areas and a storage yard; Bear Creek sediments; and Bear Creek ground water. The primary contaminants in the S-3 ponds were nitrates and uranium, with some heavy metals and organic solvents. During operations, effluent pumping into the pond was as high as 5,500 gallons per day. The oil landfarm was used for dumping waste oils and coolants containing beryllium compounds, depleted uranium, polychlorinated biphenyls (PCBs), and chlorinated organic compounds. Operations ceased in 1982, and in 1990 the landfarm was allowed by the State of Tennessee and the U.S. Environmental Protection Agency to close after actions were completed according to the approved closure plan.

The burial grounds cover an area of about 15,000 square feet. Here trenches were excavated to a depth of 14 to 25 feet and filled with hazardous and nonhazardous solid and liquid waste, including volatile organic compounds.

One of the spoil areas, known as the Rust Spoil Area, was used for the disposal of scrap material from renovation and maintenance as well as approximately 100,000 cubic yards of nonuranium contaminated construction spoils. Contaminants include solvents, asbestos, mercury, and uranium. The SY-200 Yard provided aboveground storage for PCB-containing transformers, lead shielding plates, and radioactively contaminated materials. Soil contamination is of primary concern in both spoil areas and the storage yard.

Bear Creek has been polluted with both contaminated surface and ground waters. The contaminants in surface water are mainly PCBs,

uranium, and cadmium; contaminants in ground water are nitrates, volatile organic compounds, radionuclides, trace metals, and PCBs from waste handling and storage in the past. Dense, nonaqueous phase liquids have been discovered at a depth of 270 feet below the Bear Creek burial grounds.

Planned remedial action in the Bear Creek Valley is to cover an additional 10 acres with a cap meeting the requirements of RCRA. At the boneyard and burnyard, approximately 2,000 cubic yards of soil is to be excavated and relocated to a portion of the site to be capped. In the storage yard, approximately 1,000 cubic yards of soil is to receive the same treatment, and an estimated 1.25 acres of the yard itself will be capped. The Rust Spoil Area will be capped, and a leachate collection system is to be installed around the perimeter. The remediation of the Rust Spoil Area will be completed in FY 2001.

The Bear Creek flood plain (about 12 acres) will be cleared of contaminated vegetation and soils. Contaminated ground water will be transported to other Y-12 Plant treatment facilities. Remedial action for the ground water will occur in phases. Wells with dense, nonaqueous phase liquids (deep core, 1,000 feet) are to be fitted with equipment designed to allow vertically discrete ground-water sampling and allow for a geophysical study to better define fracture systems in Bear Creek Valley. The ground-water study will be concluded no later than FY 2002.

Upper East Fork Poplar Creek

The flow of the Upper East Fork Poplar Creek is completely derived from plant runoff and ground water. (The discharge points for plant runoff are operated with permits under the National Pollutant Discharge Elimination System.) This operable unit includes ground water, a storm-sewer system, areas in which mercury had been used, an abandoned pipeline that carried nitric acid, salvage yards, and 175 individual study-area sites. The primary contaminants are radionuclides (depleted uranium, uranium-235), organic compounds (PCBs, petroleum products and solvents), and heavy metals (mercury, lead, chromium, beryllium).

Remediation for the Upper East Fork Poplar Creek is likely to require a combination of technologies. Ground-water treatment is assumed to include a treatment facility based on chemical processes (ion exchange), biological remediation through the action of microorganisms, and possibly other technologies. Full remediation may require the installation of caps over certain areas, demolition of buildings and equipment, soil excavation, and construction of a facility for treating mercury-contaminated wastewater. Remediation of the Upper East Fork Poplar Creek will be complete by FY 2010.

Decommissioning

Building 9201-4 is the only facility currently in the Y-12 decommissioning program. Current plans call for decontaminating the building for reuse. Other facilities for decontamination will continue to be identified as the Y-12 Plant focuses on new and changing missions.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Bear Creek							
Assessment	1,574	68	1,203	496	0	0	0
Remedial Actions	4,131	3,282	1,055	566	164	0	0
Surveillance And Maintenance	0	413	611	119	0	1,516	551
Building 9201-4							
Assessment	4,267	3,544	1,384	726	0	0	0
Surveillance And Maintenance	0	0	0	0	0	0	0
Facility Decommissioning	23,566	34,195	37,377	18,675	0	0	0
Chestnut Ridge							
Assessment	166	0	0	0	0	0	0
Remedial Actions	1,948	9,284	0	0	0	0	0
Surveillance And Maintenance	0	0	938	384	0	0	0
Plant Upper East Fork Poplar Creek							
Assessment	4,386	3,676	58	0	3,550	27,508	14,857
Remedial Actions	5,005	2,371	4,770	0	0	0	0
Surveillance And Maintenance	0	2,695	1,926	8,035	8,246	0	0
Site-wide Activities							
Assessment	4,413	4,978	11,358	7,429	9,018	5,677	1,731
Facility Decommissioning	0	0	0	0	0	17,713	6,741
Y-12 Decommissioning Facilities							
Assessment	40	3	422	10	0	0	0
Facility Decommissioning	0	28	0	21,929	17,727	14,463	5,004
Total	49,498	64,538	61,101	58,370	38,705	66,877	28,884

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Bear Creek								
Assessment	0	0	0	0	0	0	0	18,282
Remedial Actions	0	0	0	0	0	0	0	50,120
Surveillance And Maintenance	146	1,569	1,997	845	110	0	0	39,390
Building 9201-4								
Assessment	0	0	0	0	0	0	0	53,873
Surveillance And Maintenance	1,849	1,793	0	18,200	18,200	0	0	200,213
Facility Decommissioning	0	0	0	0	0	0	0	592,635
Chestnut Ridge								
Assessment	0	0	0	0	0	0	0	995
Remedial Actions	0	0	0	0	0	0	0	58,111
Surveillance And Maintenance	0	0	0	0	0	0	0	6,612
Plant Upper East Fork Poplar Creek								
Assessment	0	0	0	0	0	0	0	274,560
Remedial Actions	0	0	0	0	0	0	0	65,741
Surveillance And Maintenance	0	0	0	0	0	0	0	104,509
Site-wide Activities								
Assessment	0	0	0	0	0	0	0	227,428
Facility Decommissioning	0	0	0	0	0	0	0	122,270
Y-12 Decommissioning Facilities								
Assessment	0	0	0	0	0	0	0	2,414
Facility Decommissioning	5,000	0	0	0	0	0	0	320,758
Total	6,995	3,363	1,997	19,045	18,310	0	0	2,137,912

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Several buildings at the Y-12 site previously supported the Laboratory and therefore are included in environmental restoration activities at the Oak Ridge National Laboratory. These facilities are the Molten-Salt Corrosion Loop, the Coolant Salt Technology Facility, and a decontamination facility. Surveillance and monitoring are currently being performed on these facilities until they can be decontaminated for reuse.

WASTE MANAGEMENT

The waste generated at the Y-12 Plant consists of low-level radioactive waste, low-level mixed waste, sanitary waste and hazardous waste. These waste types are defined in the introduction to this report. Each type of waste requires a specific approach to its treatment, storage, and disposal.

The estimated annual volumes of waste generated at the Y-12 Plant are as follows: low-level radioactive waste, 200,000 cubic feet; low-level mixed waste, 70,000 cubic feet; hazardous waste, 360,000 cubic feet; and sanitary waste, 9 million cubic feet. These waste volumes are based on FY 1993 and FY 1994 actual figures and, as such, do not include volumes from environmental restoration and facility stabilization activities.

The plant has several waste management facilities. These facilities and support programs will be maintained and upgraded as required to ensure continued capability for safe treatment, storage, and disposal. Necessary enhancements to waste management capabilities and capacity are being implemented as part of an integrated strategy for the Oak Ridge Reservation. However, where available and cost effective, the use of private-sector facilities will take precedence over construction of new capital facilities for DOE.

Waste Treatment

Current waste treatment facilities at the Y-12 Plant include systems for collection, transfer, treatment and discharge of liquid waste; volume reduction of low-level radioactive solid waste, and waste drum cleaning operations.

Liquid waste is designated as nitrate or nonnitrate bearing and treated in separate treatment chains. The Central Pollution Control Facility treats and discharges nonnitrate dilute wastewater, acidic and caustic waste and

Major Waste Management Projects

	Five-Year Averages (Thousands of Constant 1995 Dollars)*							
	1995-2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Industrial Compaction Facility	1,700	1,080	1,080	1,080	1,080	1,080	200	38,200
Landfill, Phase II	1,533	180	360	180	180	180	180	15,500
Oil Dike 7/8 Upgrades	283	0	0	0	0	0	0	1,700
Plant Drains Waste Water Treatment	267	0	0	0	0	0	0	1,600
Production Waste Storage	600	880	880	860	880	860	160	26,200

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Note: These projects represent a subset of waste management activities. Associated program management costs are built into the estimates provided.

plating rinse waters. This facility can also perform pretreatment for nitrate bearing streams. The West End Treatment Facility processes nitrate bearing wastewater consisting of nitric acid waste, nitrate bearing rinse waters, waste coolants, and bio-denitrification sludge. Solid low-level waste treatment consists of burning depleted uranium chips from machining operations in a controlled facility. The resulting uraniuim oxide is stored in vaults. Additionally, compactor/shredder operations are conducted for solid low-level waste. The drum cleaning facility is used to clean and decontaminate empty 55-gallon metal drums containing residues of PCBs, RCRA contaminants and radioactive materials.

Low-level mixed waste, subject to land-disposal restrictions of RCRA, will be treated at the Y-12 Plant if appropriate technology (e.g., incineration) is available. Incompatible waste at the Y-12 Plant will be sent to commercial facilities for treatment and disposal.

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Low-Level Mixed Waste	3,982	6,379	6,379	6,379	6,672	7,700	6,983
Low-Level Waste	956	6,083	6,083	6,083	6,083	5,236	859
Storage and Handling							
Transuranic Waste	2,549	1,381	309	0	0	1	5
Low-Level Mixed Waste	576	3,865	4,555	4,491	4,760	5,579	4,206
Low-Level Waste	0	0	0	0	0	0	0
Hazardous Waste	30,753	6,162	6,269	6,344	5,990	5,968	5,928
Sanitary Waste	7,407	7,920	7,920	7,920	7,920	7,920	7,920
Other							
Waste Management TSD	19,385	20,727	20,727	20,727	20,727	20,727	20,727
Total	65,607	52,518	52,242	51,943	52,152	53,132	46,628

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Low-Level Mixed Waste	6,416	5,229	504	0	0	0	0	287,094
Low-Level Waste	247	247	247	247	247	202	17	165,139
Storage and Handling								
Transuranic Waste	3	3	0	0	0	0	0	23,799
Low-Level Mixed Waste	2,833	2,346	783	83	0	0	0	170,963
Low-Level Waste	1	2	1	1	1	2	0	42
Hazardous Waste	5,928	5,928	0	0	0	0	0	427,102
Sanitary Waste	7,920	7,920	0	0	0	0	0	361,243
Other								
Waste Management TSD	20,727	16,582	0	0	0	0	0	924,663
Total	44,074	38,257	1,536	331	248	203	17	2,360,044

* *Costs reflect a five-year average in constent 1995 dollars, except in FY 1995 - 2000, which is e six-yeer average.*

** *Total Life Cycle is the sum of ennual costs in constant 1995 dollars.*

In the near term, two major improvements are expected in the treatment capabilities of the Y-12 Plant. One is development of the Industrial Waste Compaction Facility. This facility will allow the plant to compact solid sanitary and industrial waste in a location adjacent to onsite disposal facilities. Compaction will significantly extend landfill life.

The second improvement is an upgrading of the Drains Wastewater Treatment system. This project will reroute the flow of wastewater streams from building drains to appropriate treatment systems to improve compliance with Federal wastewater discharge requirements.

Waste Storage

Storage facilities at the Y-12 Plant consist of bulk tank storage for hazardous and mixed waste oils and solvents, bulk tank storage for bio-denitrification sludges; container storage for low-level mixed, PCB, hazardous and security classified waste; and long term storage of solid low-level waste. Modifications to the West End Treatment Facility will provide pretreatment to nitrate bearing wastewaters. The pretreatment process will significantly reduce the volume of sludge produced for which no disposal is currently available.

The Y-12 Plant also is developing its capabilities to conduct nondestructive assays of various waste types and certify compliance with acceptance criteria. Improvements in these capabilities will greatly increase the quantity of waste removed from storage for eventual treatment and disposal.

Waste Disposal

The Y-12 Plant provides landfills at its site for nonhazardous sanitary/industrial waste and construction debris generated not only at the plant but also at other parts of the Oak Ridge Reservation. These landfills annually accept approximately 30 million pounds of sanitary and industrial waste not disposed at commercial or municipal facilities. The existing landfills will be nearly filled in mid-1997, and plans have been made to provide additional capacity at that time.

Low-level radioactive waste is no longer disposed at the Y-12 Plant. It is currently being stored pending availability of offsite disposal capability at other DOE sites or planned onsite low-level waste disposal facilities.

Disposal for hazardous chemical waste and mixed low-level waste will be provided at offsite facilities licensed to dispose of waste regulated under the RCRA. The disposal of these wastes will be coordinated through central disposal services at the Oak Ridge Reservation.

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	9,988	37,621	42,995	13,245	0	0	0	529,236

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

When a facility is transferred from Defense Programs to the Environmental Management program, it undergoes a process of stabilization in which the facility is shut down, radioactive and hazardous materials are removed, and other actions are taken as necessary to mitigate an immediate threat to health and safety. Once this is accomplished, the facility is maintained and monitored as appropriate pending further action, which is usually decommissioning.

Facility stabilization and maintenance began at the Y-12 Plant in 1995. Of the 10 facilities slated to undergo this process, one, a storage building for dye-penetrant waste, has begun stabilization. In 1996 stabilization will start at one of the remaining nine facilities. The waste resulting from the stabilization will include transuranic, low-level radioactive, low-level mixed, high-level, and hazardous chemical waste. Currently projections indicate stabilization and maintenance at the Y-12 Plant will be completed by 2016.

LANDLORD FUNCTIONS

The Landlord responsibility for the Y-12 Plant rests with DOE's Office of Defense Programs.

PROGRAM MANAGEMENT

Program management, through the technical integration and contract management functions, provides essential technical support, administrative integration, and oversight to environmental restoration and waste management. This support is aimed at ensuring the proper identification, characterization, remediation, and revitalization of contaminated sites. It includes technical programs, technical oversight, community relations, the integration of environmental restoration with waste management, and business management.

Included in program management is financial funding for the State of Tennessee to support its independent monitoring and oversight of activities and facilities, as outlined in the Agreement-In-Principle with the State.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Y-12.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Program Management	16,086	25,168	22,920	19,892	17,168	49,753	28,906

	2035	2040	2045	2050	2055	2060	2065	Life Cycle
Program Management	21,036	9,564	384	83	62	51	4	1,071,466

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	45,508	63,247	59,879	57,203	37,931	65,539	28,307
Waste Management	65,607	52,518	52,242	51,943	52,152	53,132	46,628
Nuclear Material and Facility Stabilization	9,788	36,869	42,135	12,981	0	0	0
Program Management	16,086	25,168	22,920	19,892	17,168	49,753	28,906
Total	139,989	177,802	177,176	142,018	107,251	168,424	103,840

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	6,855	3,295	1,957	18,664	17,944	0	0	2,095,153
Waste Management	44,074	38,257	1,536	331	248	203	17	2,360,045
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	518,651
Program Management	21,036	9,564	384	83	62	51	4	1,071,471
Total	71,966	51,117	3,877	19,078	18,254	254	21	6,045,300

* *Costs reflect a five-yeer average in constent 1995 dollers, except in FY 1995 - 2000, which is e six-yeer everege.*

** *Totel Life Cycle is the sum of ennual costs in constant 1995 dollars.*

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	990	1,291	1,222	1,167	774	1,338	578
Waste Management	0	0	0	0	0	0	0
Nuclear Material and Facility Stabilization	200	752	860	265	0	0	0
Program Management	0	0	0	0	0	0	0
Total	1,190	2,043	2,082	1,432	774	1,338	578

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	140	67	40	381	366	0	0	42,758
Waste Management	0	0	0	0	0	0	0	0
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	10,585
Program Management	0	0	0	0	0	0	0	0
Total	140	67	40	381	366	0	0	53,343

* *Costs reflect a five-year average in constent 1995 dollars, except in FY 1995 - 2000, which is e six-yeer averege.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

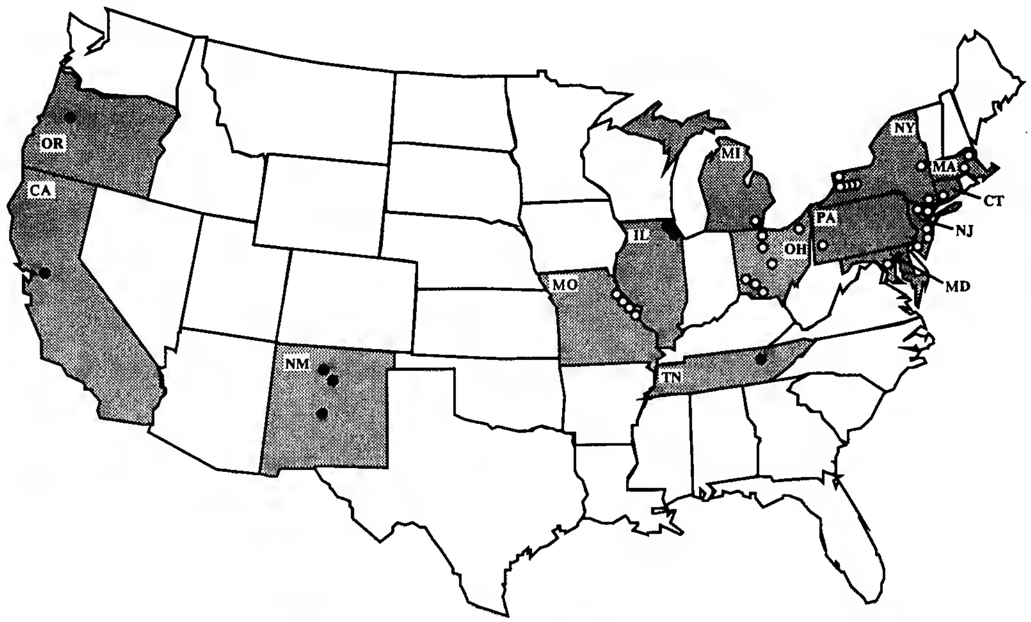
Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
	Building 9201-4 Y-12 D&D Hazard Abate - Interim Action Complete	1995
	BCV OU - 2 RI\FS\PP\ROD - Remediation Complete	2001
	Reduction of Mercury in Plant Effluents - Interim Action Complete	2001
	BCV OU - 1 RI\FS- Remediation Complete	2003
	CR OU - 2 FACP RI/FS/ROD -- Remediation Complete	2005
	UEFPC OU - 1 Remediation Complete	2010
	Building 9201 - 4 Asbestos Removal - Interim Action Complete	2015
	Building 9201 - 4 D&D Complete	2016
	BCV OU - 4 GW RI/FS - Remediation Complete	2020
	Complete all Environmental Restoration Activities	2055
Waste Management		Fiscal Year
	Complete construction of Steam Plant Ash Disposal Facility	1995
	Complete construction of Classified Solid Waste Storage Facity	1995
	Complete construction of Plant Drain Rerouting Project	1996
	Complete upgrades to Oil Dikes 7/8	1998
	Complete construction of Industrial Landfill V and Construction/Demolition of Landfill VII, Phase II	1999
	Complete all Waste Management Activities	2061

For further information on this site, please contact:

Public Participation Office		*(615) 576-1590*
Public Affairs Office		*(615) 576-0885*
Technical Liaison:	*Sherry Lankford*	*(615) 576-9559*
	Joyce Segar	*(615) 576-0850*

FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP)



Missouri Sites

- *† Latty Avenue Properties, Hazelwood
- * St. Louis Airport Site, St. Louis
- * St. Louis Airport Site Vicinity Prop., St. Louis
- St. Louis Downtown Site, St. Louis

New Jersey Sites

- *† Maywood Interim Storage Site, Maywood
- *† Wayne Interim Storage Site, Wayne/Pequannock
- † Middlesex Sampling Plant, Middlesex
- † New Brunswick Site, New Brunswick
- Du Pont & Company, Deepwater

New York Sites

- † Niagara Falls Storage Site, Lewiston
- † Colonie Interim Storage Site, Colonie
- Ashland 1, Tonawanda
- Ashland 2, Tonawanda
- Linde Center, Tonawanda
- Seaway Industrial Park, Tonawanda
- Bliss & Laughlin Steel, Buffalo

Additional Sites

- Albacraft, Oxford, OH
- Associate Aircraft, Fairfield, OH
- B&T Metals, Columbus, OH
- Baker Brothers, Toledo, OH
- Chapman Valve, Indian Orchard, MA
- CE Site, Windsor, CT
- General Motors, Adrian, MI
- Granite City Steel, Granite City, IL
- HHM Safe Co., Hamilton, OH
- Luckey Site, Luckey, OH
- Madison Site, Madison, IL
- Painesville Site, Painesville, OH
- Seymour Specialty Wire, Seymour, CT
- * Shpack Landfill, Norton, MA
- Ventron Corporation, Beverly, MA
- W.R. Grace & Company, Curtis Bay, MD

Completed Sites

- Acid/Pueblo Canyon, Los Alamos, NM
- Albany Research Center, Albany, OR
- Aliquippa Forge, Aliquippa, PA
- Bayo Canyon, Los Alamos, NM
- C.H. Schnoor, Springdale, PA
- Chupadera Mesa, White Sands Missile Range, NM
- Elza Gate Site, Oak Ridge, TN
- Kellex/Pierpoint, Jersey City, NJ
- Middlesex Municipal Landfill, Middlesex, NJ
- National Guard Armory, Chicago, IL
- Niagara Falls Storage Site Vicinity Prop., Lewiston, NY
- University of California, Berkeley, CA
- University of Chicago, Chicago, IL
- Baker and Williams Warehouses, New York City

O REMEDIAL ACTION ONGOING OR PLANNED	● REMEDIAL ACTION COMPLETED	† DOE-OWNED OR -LEASED SITE	* NPL SITE	▒ STATE WITH FUSRAP SITE(S)

PAST, PRESENT, AND FUTURE MISSIONS

The Manhattan Engineer District and its immediate successor, the Atomic Energy Commission, conducted several programs during the 1940's and 1950's involving research, development, processing, and production of uranium and thorium, and storage of processing residues. Nearly all of this work involved some participation by private contractors and institutions.

Privately owned and institutionally owned sites contaminated during this early period of the nuclear program were decontaminated or stabilized in accordance with survey methods and guidelines then in existence. These sites were subsequently released for other uses. Since that time, however, radiological guidelines have become more stringent and reevaluation is required.

Established in 1974 under the provisions of the Atomic Energy Act, the Formerly Utilized Sites Remedial Action Program (FUSRAP) is required to identify previously decontaminated sites used by the Manhattan Engineer District

and the Atomic Energy Commission, reevaluate their radiological condition, and take appropriate remedial action where necessary. FUSRAP encompasses 46 sites in 14 States, including 5 sites associated with commercial ventures added by the Energy and Water Development Appropriations Acts of 1984 and 1985 (PL 98-50 and PL 98-360, respectively).

Following appropriate remediation, certification documents will be issued for each site that will list any restrictions regarding future use of the site.

Continued congressional authorization has been provided each year in the passage of subsequent Energy and Water Development Appropriations Acts. The Department of Energy has entered into three Federal Facilities Agreements with the Environmental Protection Agency for five FUSRAP sites currently on the National Priorities List.

Remedial actions are designed to reduce or eliminate the health risks of exposure to radioactive contaminants and may include excavating and disposing contaminated material prior to disposal. The following list shows FUSRAP sites by State.

ENVIRONMENTAL RESTORATION

Sites that became contaminated during the Atomic Energy Commission era were cleaned up and released for use under the guidelines in effect at the time. Because those cleanup and disposal guidelines were not as strict as today's guidelines, trace amounts of radioactive materials remained at some of the sites. Over the years, some of these radioactive materials at the sites became dispersed throughout soil and rubble due to earth-moving activities and building demolition. Waste was spread by erosion, wind, and transport of materials onto some vicinity properties.

None of the sites pose an immediate health risk to the public or environment under current land uses. The contaminated materials have very low concentrations, and people are not exposed to them for long periods of time. Although these materials do not pose an imminent threat, they will remain radioactive for thousands of years, and health risks could increase if the land use was to change. Most of the contaminated material remains uncontrolled and is subject to continued migration.

WASTE MANAGEMENT

All waste management and program management activities within FUSRAP are conducted within the scope of environmental restoration.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no current or planned nuclear material and facility stabilization activities required for sites within the FUSRAP program.

LANDLORD FUNCTIONS

Because most of these sites are owned by commercial entities, FUSRAP is not responsible for landlord/infrastructure activities other than those required by ongoing environmental restoration. Therefore, all landlord costs associated with the program are provided within the scope of environmental restoration.

FUSRAP Sites (by State)

STATE / NO. OF SITES	SITE
CALIFORNIA: 1 site	University of California, Berkeley *
CONNECTICUT: 2 sites	Combustion Engineering, Windsor
	Seymour Specialty Wire Co., Seymour *
ILLINOIS: 4 sites	Illinois National Guard Armory, Chicago *
	University of Chicago, Chicago *
	Madison, Madison
	Granite City Steel, Granite City *
MARYLAND: 1 site	W. R. Grace & Company, Curtis Bay
MASSACHUSETTS: 3 sites	Chapman Valve, Indian Orchard
	Ventron, Beverly
	Shpack Landfill, Norton (1)
MICHIGAN: 1 site	General Motors, Adrian
MISSOURI: 4 sites	St. Louis Downtown Site, St. Louis
	St. Louis Airport Site Vicinity Properties, St. Louis (1)
	Latty Avenue Properties, Hazelwood (1)
	St. Louis Airport Site, St. Louis (1)
NEW JERSEY: 7 sites	DuPont & Company, Deepwater
	Middlesex Municipal Landfill, Middlesex*
	Middlesex Sampling Plant, Middlesex
	Maywood, Maywood/Rochelle Park (1)
	Wayne, Wayne (1)
	New Brunswick Site Laboratory, New Brunswick
	Kellex/Pierpont, Jersey City *
NEW YORK: 9 sites	Ashland 1, Tonawanda
	Ashland 2, Tonawanda
	Seaway Industrial Park, Tonawanda
	Linde Air Products, Tonawanda
	Bliss & Laughlin Steel, Buffalo
	Niagara Falls Storage Site Vicinity Properties, Lewiston *
	Colonie, Colonie
	Baker & Williams Warehouses, New York *
	Niagara Falls Storage Site, Lewiston
OHIO: 7 sites	Alba Craft, Oxford
	Luckey, Luckey
	Painesville Site, Painesville
	HHM Safe Co., Hamilton
	Baker Brothers, Toledo
	B&T Metals, Columbus
	Associated Aircraft and Tool Manufacturing, Fairfield
PENNSYLVANIA: 2 sites	C. H. Schnoor, Springdale *
	Aliquippa Forge, Aliquippa *
NEW MEXICO: 3 sites	Acid /Pueblo Canyons, Los Alamos*
	Bayo Canyon, Los Alamos*
	Chupadera Mesa, White Sands Missile Range *
OREGON: 1 site	Albany Research Center, Albany *
TENNESSEE: 1 site	Elza Gate, Oak Ridge *

(1) NPL Sites

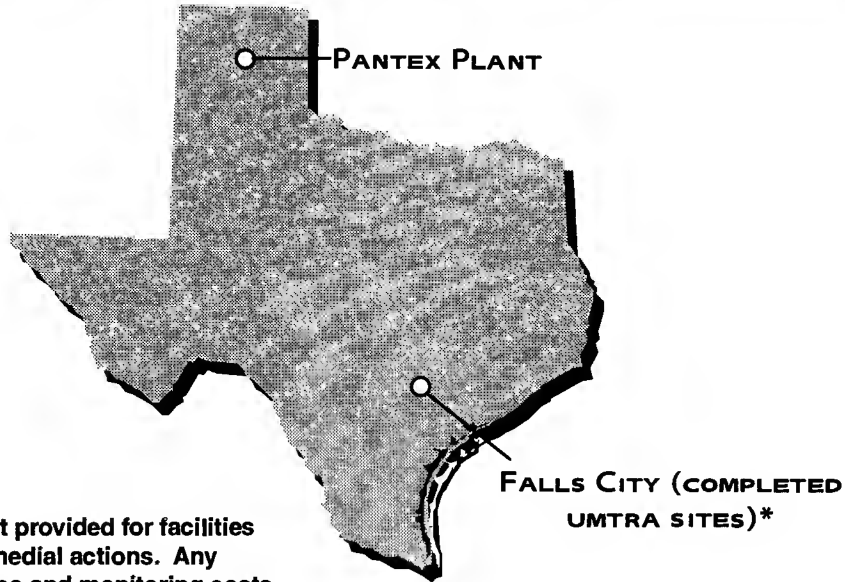
** Completed Sites*

Major Activity Milestones

ACTIVITY		COMPLETION DATE
Environmental Restoration		Fiscal Year
	Connecticut Complete Assessment	1997
	Connecticut Complete Remedial Action	1999
	Illinois Complete Assessment	2000
	Illinois Complete Remedial Action	2000
	Maryland Complete Assessment	1998
	Maryland Complete Remedial Action	2000
	Massachusetts Complete Assessment	1996
	Massachusetts Complete Remedial Action	1998
	Michigan Complete Assessment	1995
	Michigan Complete Remedial Action	1995
	Missouri Complete Assessment	1996
	Missouri Complete Remedial Action	2000
	New Jersey Complete Assessment	1996
	New Jersey Complete Remedial Action	2000
	New York Complete Assessment	2000
	New York Complete Remedial Action	2000
	Ohio Complete Assessment	2000
	Ohio Complete Remedial Action	2000

Note: Completion dates pertain to the last FUSRAP site within the State.

For further information on this site, please contact:	*Public Participation Office*	*(615) 576-1590*
	Public Affairs Office	*(615) 576-0885*
	Technical Liaison: Melyssa Noe	*(615) 241-3315*



***Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for this facility are provided in the table below.**

TEXAS

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Pantex Plant	40,437	30,136	31,290	34,776	34,430	33,129
Completed UMTRA Surveillance & Monitoring	2,640	490	2,940	1,520	870	4,570
Total	43,077	30,626	34,230	36,296	35,300	37,699

* *Costs for FY 1995 reflect Congrassional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 raflact Budgat Shortfall Scanario, costs for shaded area assuma 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Pantex Plant	30,278	19,545	23,847	28,791	18,954	15,644	12,791
Completed UMTRA Surveillance & Monitoring	2,306	1,396	921	669	0	0	0
Total	32,585	20,941	24,768	29,460	18,954	15,644	12,791

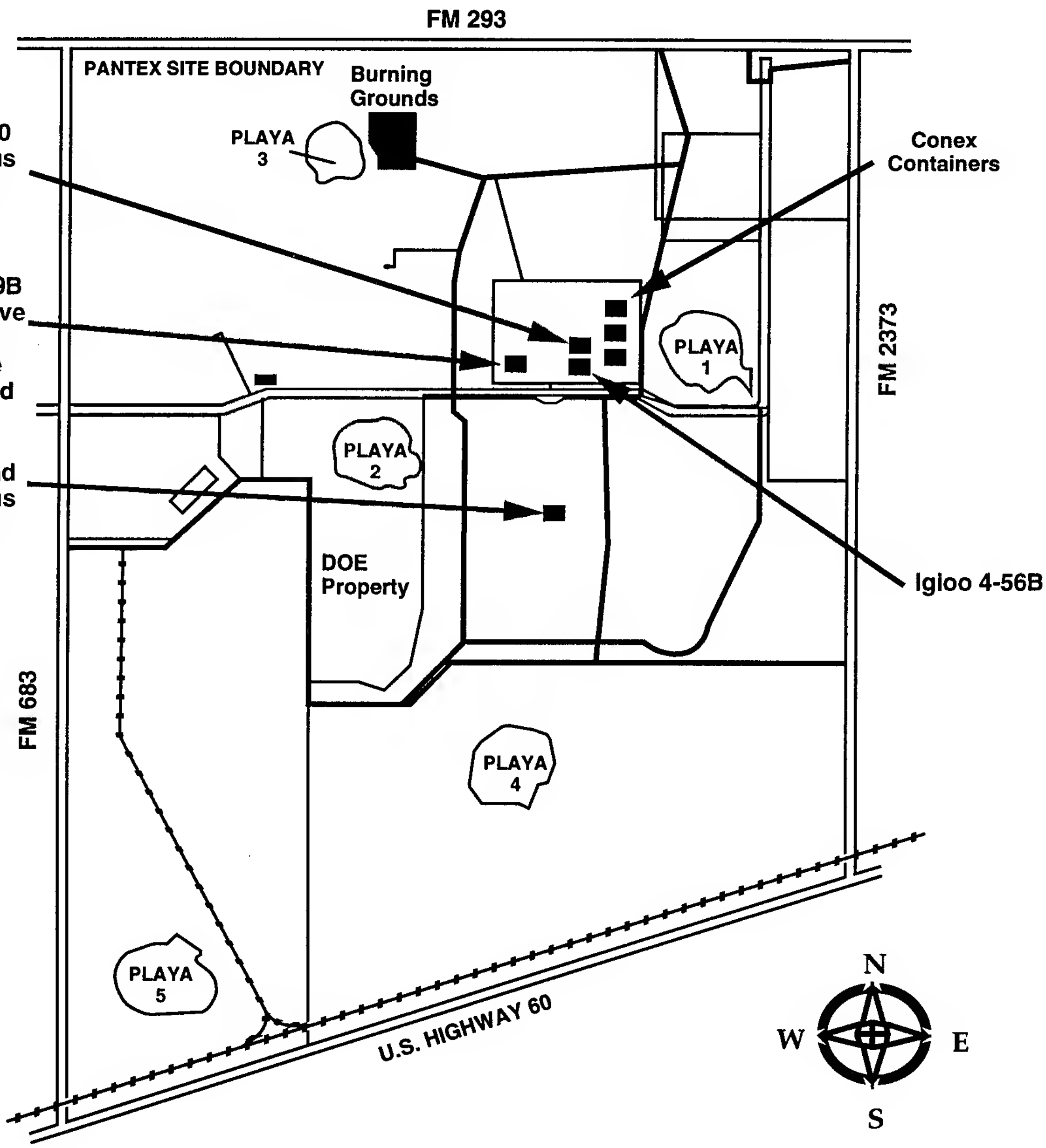
	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Pantex Plant	1,121	0	0	0	0	0	0	785,136
Completed UMTRA Surveillance & Monitoring	0	0	0	0	0	0	0	28,771
Total	1,121	0	0	0	0	0	0	813,907

** *Costs reflact a fiva-yaar avaraga in constant 1995 dollars, axcapt in FY 1995 - 2000, which is a six-yaar avaraga.*

*** *Total Lifa Cycla is tha sum of annual costs in constant 1995 dollars.*

PANTEX PLANT

The Pantex Plant is located in the panhandle of Texas, about 17 miles northeast of downtown Amarillo. The site covers about 16,000 acres.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	18,947	11,043	10,036	10,751	10,034	10,313
Waste Management	13,008	11,164	12,899	15,196	13,893	14,229
Nuclear Material and Facility Stabilization	2,530	2,630	2,630	2,630	2,630	2,630
Program Management	5,952	5,299	5,725	6,199	5,873	5,957
Total	40,437	30,136	31,290	34,776	32,430	33,129

* Costs for FY 1995 reflact Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budgat Shortfall Scenario, costs for sheded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	11,130	872	0	10,949	2,737	0	0
Waste Management	12,422	12,514	13,840	12,522	12,557	12,515	10,233
Nuclear Material and Facility Stabilization	2,609	2,615	6,547	109	0	0	0
Program Management	4,118	3,544	3,460	5,211	3,659	3,129	2,558
Total	30,278	19,545	23,847	28,791	18,954	15,644	12,791

	FY 2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	0	0	0	0	0	0	0	139,572
Waste Management	897	0	0	0	0	0	0	449,920
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	62,007
Program Management	224	0	0	0	0	0	0	133,637
Total	1,121	0	0	0	0	0	0	785,136

** Costs reflect e five-yaar average in constent 1995 dollars, axcept in FY 1995 - 2000, which is e six-yaar avarege.

*** Totel Life Cycle is tha sum of ennuel costs in constent 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

The Pantex Plant was built by the U.S. Army in 1942 as a conventional bomb plant. It was decommissioned after World War II and sold to Texas Tech University as excess government property. In the 1950's, the Atomic Energy Commission recovered 10,000 acres of the site, renovated portions of the plant, and constructed new facilities for the manufacture of high explosives used in nuclear weapons and for the final assembly of nuclear weapons. During the mid-1960's, the plant was expanded when it assumed weapons maintenance and modification tasks from plants closed in San Antonio, Texas, and Clarksville, Tennessee. The last expansion came with the closing of a sister plant in Burlington, Iowa in 1975. Pantex has been the only plant of its type since Burlington's closing in 1975.

The mission of the Pantex Plant is fabricating high explosives for nuclear weapons, assembling nuclear weapons, maintaining and evaluating nuclear weapons in the stockpile, and dismantling nuclear weapons as they are retired from the stockpile. At present the principal operation is disassembly of nuclear weapons.

The basic mission is not expected to change in the foreseeable future. The Pantex Plant will continue to be the only facility for the dismantlement and maintenance of the nation's nuclear weapons stockpile. It will also provide interim storage for plutonium in a facility the Department of Energy (DOE) plans to develop. The Pantex Plant is managed by DOE's Office of Defense Programs, which will continue to serve as the landlord.

ENVIRONMENTAL RESTORATION

The production of high-explosives components for nuclear weapons has resulted in the contamination of soils, primarily from organic solvents and high explosives. In addition, tests of weapons components have contaminated some areas with high explosives and heavy metals. The contaminants may migrate to subsurface soils and eventually to ground water. Ground-water contamination has been detected in the perched aquifer, located a few hundred feet above the Ogallala Aquifer. In May 1994, the U.S. Environmental Protection Agency (EPA) placed Pantex on the National Priorities List. The Amarillo Area Office is currently negotiating a tri-party Federal Facility Agreement with the EPA and the State of Texas Natural Resources Conservation Commission.

Environmental restoration activities at the Pantex Plant are conducted in compliance with a Resource Conservation Recovery Act (RCRA) permit issued by the Texas Natural Resources Conservation Commission in April 1991. They began in 1992 and are expected to be completed by FY 2000 because the environmental restoration program has been accelerated.

Operable Units

Pantex has 144 solid waste management units grouped into 15 operable units for investigation purposes. The latter included 110 potential release sites identified at the plant. RCRA Facility Investigations have been completed for all operable units. For operable units PX-3 and PX-4, no further action is recommended. Unit PX-15, the Hypalon Pond, was closed in 1992. Voluntary corrective actions are being taken at several sites with no further actions planned at several other sites. Brief descriptions of the active operable units follow.

Operable Unit PX-1: Burning Ground Sites

No further action is recommended for all closed burning ground sites except for the flashing pits, which will require further investigation. A voluntary corrective action is planned to accelerate cleanup. Removal and disposal or incineration is planned for the contaminated soil. This project is scheduled for completion in fall 1997.

Operable Unit PX-2: High Priority Potential Release Sites

No further action is recommended for six of these potential release sites. However, a voluntary corrective action will be conducted at two sites. One is building FS-16, where the surface impoundment and sump will be removed; the other is the FS-22 container, which will also be removed. In both cases, sampling will be conducted in the area to confirm cleanup. One site, the concrete sump in building 12-68, requires further investigation.

A recommendation of no further action is expected to be submitted to the Texas Natural Resources Conservation Commission in the spring of 1996.

Operable Unit PX-5: Fire Training Area Burn Pits

A voluntary corrective action study recommended the removal and offsite disposal of contaminated soil. The investigation concluded the soil contamination at the Fire Training Area Burn Pits is restricted to the upper four feet. Remediation, with design starting in FY 1995, will involve the removal of shallow contaminated soil, sampling, and reclamation. Closeout is expected by fall 1995.

Operable Unit PX-6: Ground Water in Zone 12 North

An expedited site characterization is to be conducted by the Argonne National Laboratory. Three additional wells for monitoring perched aquifers and one well for monitoring the Ogallala aquifer were proposed. Ground-water monitoring is also conducted for several other operable units that are a potential source of contaminants to ground water.

Operable Unit PX-7: Landfills

Preliminary data packages are still being validated. The landfills are expected to be further investigated to determine levels of contamination. The extent of remediation will not be known until all investigations have been completed. It is nonetheless expected remediation can be completed by the year 2000.

Operable Unit PX-8: Ditches and Playas

Three of the six water flow systems in this operable unit require additional surface and subsurface sampling. Two of the six require additional sampling of surface areas only. The sixth flow system requires the drilling of additional subsurface monitoring wells. This last activity will become part of the Zone 12 ground-water assessment, scheduled for summer 1997.

Operable Unit PX-9: Firing Sites

Soil investigations for the firing sites are scheduled for Spring 1995. They will be followed by surveying and recovering visible depleted uranium from surface and near surface soils. Any depleted uranium will be sent to the Nevada Test Site for disposal. A closeout of this operable unit is expected by summer 1997.

Operable Unit PX-10: Leaking Underground Storage Tanks at Buildings 12-35 and 16-1

Further investigation of potential sources of trichloroethylene is recommended, but it will be conducted under Operable Unit PX-12. On the basis of the RCRA Facility Investigation, corrective action is not recommended for the site of the underground storage tank at building 16-1. Additional field work is required to further characterize the site of the underground storage tank at building 12-35.

Operable Unit PX-11: Miscellaneous Sites with Explosives and Radioactive Materials

Soil investigations are in process and a voluntary corrective action is planned. It will combine in situ bioremediation, soil removal, and offsite disposal. The project is expected to be closed out in the summer of 1997.

Operable Unit PX-12: Miscellaneous Chemical Spills and Releases

No further action will be recommended for 8 of the 17 sites and voluntary corrective action is recommended for the remaining 9 sites. A one-

year treatability study is planned to study the ground water at Operable Unit PX-15, the Hypalon Pond. The project is scheduled for completion in Spring 1998.

Operable Unit PX-13: Supplemental Verification Sites

No further action was recommended for 7 of 8 supplemental verification sites. Site 8 in Zone 10, an abandoned landfill, is included in the RCRA Facility Investigation for Operable Unit PX-7 landfill because of its proximity to the sanitary landfills. Decisions of no further action are being pursued for spring 1996.

Operable Unit PX-14: Underground Storage Tanks at Other Locations

No further action was recommended for all sites in this operable unit except for underground storage tank 9 that requires fieldwork. Six additional borings will be drilled to determine the extent of contamination by petroleum hydrocarbons. A treatability study will be conducted at the site of this underground tank. Ground-water monitoring will be conducted under Operable Unit PX-12. Additional investigations are underway to include bioventing operations. Closeout is expected by summer 1996.

Waste from Environmental Restoration

The assessment activities at 12 of 14 operable units have resulted in the determination that 97 percent of the waste material generated is nonhazardous. In situ remediation will be the primary technology used for remediation of the hazardous waste. As a result, this waste will not be sent to waste management for treatment and disposal.

Pantex has implemented strategies to reduce the amount of waste generated during investigations, as well as the amount of waste handled, treated, or disposed of during site cleanups. A key point of this strategy is minimizing the amount of waste generated

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration								
Assessment	5,488	0	0	0	0	0	0	32,930
Remedial Actions	5,641	872	0	0	0	0	0	38,210
Facility Decommissioning								
Facility Decommissioning	0	0	0	10,949	2,737	0	0	68,432
Total	11,130	872	0	10,949	2,737	0	0	139,572

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

during remedial feasibility investigations by using sonic drilling, geophysical and soil gas survey techniques, and other types of surveys that generate minimal waste.

WASTE MANAGEMENT

Pantex operations generate various types of waste. The waste produced by the assembly and dismantlement of weapons includes high explosives and solvents. These operations also produce radioactive process water, debris contaminated with radioactive materials, liquid and solid low-level waste, low-level mixed waste, hazardous waste, sanitary waste, heavy metals, and solvents. Waste is also produced by various support operations, such as the chemistry laboratories, maintenance, and the vehicle fleet.

Pantex does not currently generate any high-level radioactive waste or transuranic waste. Four drums of transuranic waste generated from an isolated event are being stored at the plant and will be sent to another DOE site for storage until they can be shipped to the Waste Isolation Pilot Plant for disposal.

In 1993, the quantities of waste managed at Pantex were 130 cubic meters of low-level radioactive waste; 37.5 cubic meters of low-level mixed waste; 1615.26 metric tons of hazardous waste regulated by RCRA, the State of Texas, or the Toxic Substances Control Act; and 304 metric tons of sanitary waste. In the future, the volume of operations-generated waste is expected to decrease due to waste minimization efforts and reduced dismantlement levels.

Waste Treatment

For low-level mixed waste, Pantex has developed a site treatment plan, as required by the Federal Facility Compliance Act. The plan

Waste Management Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
Low-Level Mixed Waste	1,456	1,466	1,466	1,477	1,512	1,470	1,286
Low-Level Waste	4,547	4,579	4,579	4,579	4,579	4,579	3,774
Hazardous Waste	6,280	6,327	7,654	6,325	6,325	6,325	5,060
Sanitary Waste	140	141	141	141	141	141	113
Total	12,422	12,514	13,840	12,522	12,557	12,515	10,233

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
Low-Level Mixed Waste	454	0	0	0	0	0	0	54,394
Low-Level Waste	443	0	0	0	0	0	0	162,852
Hazardous Waste	0	0	0	0	0	0	0	227,754
Sanitary Waste	0	0	0	0	0	0	0	4,920
Total	897	0	0	0	0	0	0	449,920

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

calls for the development and use of (1) existing onsite facilities, (2) commercial treatment, and (3) onsite treatment using mobile treatment units. The engineering and fabrication of the mobile treatment units will start in FY 1996. Validation and startup will occur in FY 1998, with regular treatment operations beginning in FY 2000. Mobile treatment units are expected to require upgrading every 12 years (in FY 2010 and FY 2022).

A proposed Hazardous Waste Treatment and Processing Facility is designed for low-level waste, mixed waste, and hazardous waste. It will also accommodate the mobile treatment units. Construction is anticipated to be completed in FY 1999, with processing beginning in FY 2000.

Waste contaminated with high explosives is treated at the Pantex Plant burning grounds. Burning ground ash is packaged and disposed of offsite. At present, the burning grounds are being upgraded, with completion expected in FY 1997. Alternatives to burning, such as base hydrolysis and molten-salt extraction, are being explored.

Treatment for low-level radioactive waste consists of stabilization and solidification to meet the acceptance criteria for the Nevada Test Site. Low-level waste is shipped to Nevada Test Site for disposal.

Waste Storage

A RCRA hazardous waste staging facility has been designed and is planned for completion in FY 1996. This facility will provide storage for 1,600 drums of hazardous, mixed, and low-level radioactive waste. The staging facility will require upgrading in FY 2026.

Waste Disposal

For the near future, two quarterly shipments of low-level waste will be shipped to the Nevada Test Site annually. Hazardous waste is shipped monthly and one shipment of low-level mixed waste was made in FY 1994.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The facility stabilization and maintenance process began at Pantex in 1995. All eight Pantex facilities have begun stabilization. Some of these facilities include a chlorination building, a digester, explosives machining, synthesis buildings, and an electrical substation. It is assumed for the purposes of this report that the remaining facility (a sewage tank) will begin the stabilization process in 1996. This report assumes the stabilization and maintenance process at Pantex will be completed by 2015.

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	2,609	2,615	6,547	109	0	0	0	62,007

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

LANDLORD FUNCTIONS

The Department's Office of Defense Programs is the landlord at Pantex and is responsible for associated costs and activities.

PROGRAM MANAGEMENT

Pantex has no separate funding for program management. All program management activities are performed within the budgets for waste management and environmental restoration activities. This estimate employed a factor based on current and anticipated program needs to create an independent cost category. For FY 1995-FY 2000, program management activities at the site consume approximately 20 percent of the total budget. Program management activities included in the budget for the Environmental Management program consist of general program management, quality assurance, waste minimization, public participation, and activities related to the environment, safety, and health.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Pantex.

Program Management Cost Estimates

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	4,118	3,544	3,460	5,211	3,659	3,129	2,558	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Program Management	224	0	0	0	0	0	0	133,637

** Costs raflact a five-year avaraga in constant 1995 dollars, axcapt in FY 1995-2000, which is a six-yaar average.*

*** Total Lifa Cycle is tha sum of annual costs in constant 1995 dollars.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	11,130	872	0	0	0	0	0
Waste Management	12,422	12,514	13,840	12,522	12,557	12,515	10,233
Nuclear Material and Facility Stabilization	2,609	2,615	6,446	0	0	0	0
Program Management	4,118	3,544	3,460	5,211	3,659	3,129	2,558
Total	31,901	19,545	23,746	17,733	16,216	15,644	12,791

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	0	0	0	0	0	0	0	71,140
Waste Management	897	0	0	0	0	0	0	449,920
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	60,957
Program Management	224	0	0	0	0	0	0	133,637
Total	1,121	0	0	0	0	0	0	715,654

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	0	0	0	10,949	2,737	0	0	68,432
Nuclear Material and Facility Stabilization	0	0	101	109	0	0	0	1,050
Total	0	0	101	11,058	2,737	0	0	69,482

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

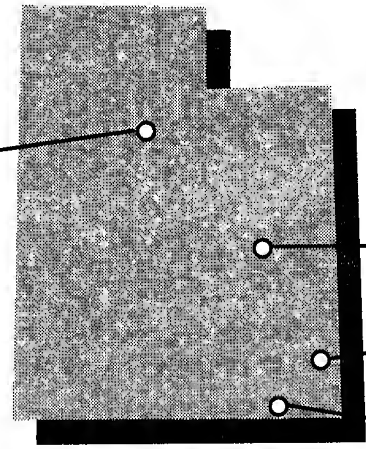
** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration:		Fiscal Year
Misc Chem Spills and Release Sites	Permit Modification Based on No Further Action/Voluntary Corrective Action	1998
Landfills	Complete Corrective measures construction	1998
Fire Training Area Burn Pits	Permit Modification Based on No Further Action/Voluntary Corrective Action	1995
Firing Sites	Permit Modification Based on No Further Action/Voluntary Corrective Action	1997
Former Cooling Tower	Permit Modification Based on No Further Action	1995
Misc HE/Rad	Permit Modification Based on No Further Action/Voluntary Corrective Action	1997
Hypalon Pond	Permit Modification Based on No Further Action	1995
Ditches and Playas	Permit Modification Based on No Further Action/Voluntary Corrective Action	1997
High Priority Potential Release Sites	Permit Modification Based on No Further Action/Voluntary Corrective Action	1996
OSTP Sludge Beds	Permit Modification Based on No Further Action	1995
Supplemental Verification Sites	Permit Modification Based on No Further Action	1996
Leaking USTs at Bldgs 12-35 and 16-1	Permit Modification Based on No Further Action	1995
Underground Storage Tanks at Other Locations	Permit Modification Based on No Further Action/Voluntary Corrective Action	1996
Zone 12 Ground Water	Complete corrective measures	1999
Burning Grounds	Permit modification based on No Further Action	1996
Waste Management:		Fiscal Year
Proposed Site Treatment Plan	Submit to State of Texas	1995
Hazardous Waste Treatment & Processing Facility	Complete Construction	1999
Mobile Treatment Units	Final Design (Title II) Complete	1996
Hazardous Waste Staging Facility	Complete Construction	1996
All Waste Management Activities	Complete	2030

For further information on this site, please contact:

Public Participation Office	*(505) 845-5951*
Public Affairs Office	*(806) 477-3120*
Technical Liaison: Dan Ferguson	*(806) 477-3126*



*** Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for these facilities are provided in the table below.**

UTAH

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Monticello Millsite	23,960	36,770	31,350	29,700	19,480	29,390
Completed UMTRA Surveillance & Monitoring	3,250	1,490	490	280	170	190
Total - Utah	27,210	38,260	31,840	29,980	19,650	29,580

* *Costs for FY 1995 reflact Congrassional Appropriation, costs for FY 1996 raflact EM budgat submission, costs for FY 1997-2000 raflect Budgat Shortfall Scanario, costs for shaded area assume 3% annual inflation.*

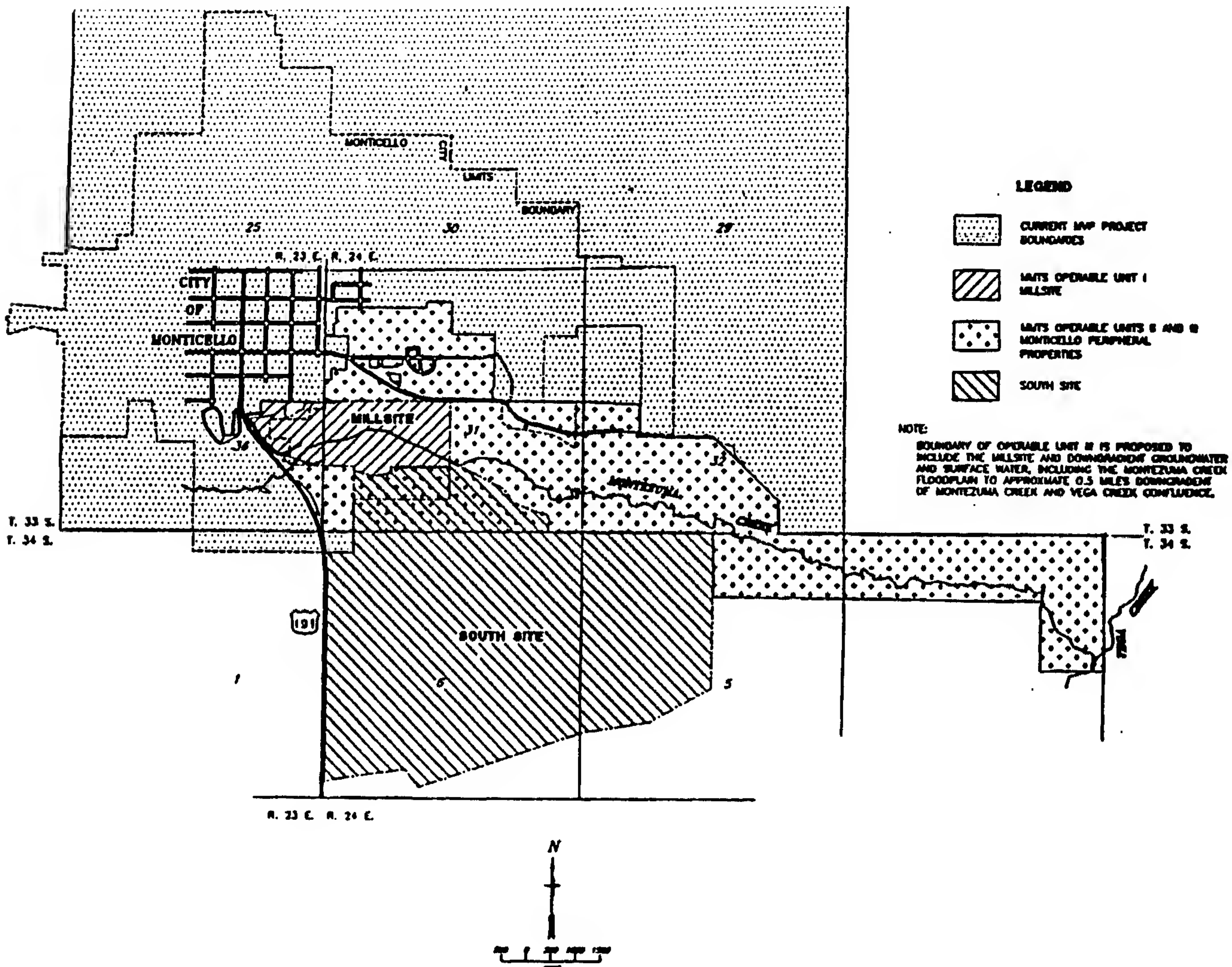
*Five-Year Averages (Thousands of Constant 1995 Dollars)***

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Monticello Millsite	22,525	0	0	0	0	0	0	135,148
Completed UMTRA Surveillance & Monitoring	1,035	820	0	0	0	0	0	10,314
Total - Utah	23,560	820	0	0	0	0	0	145,462

** *Costs reflect a five-year avarage in constant 1995 dollars, except in FY 1995 - 2000, which is a six-yaar avaraga.*

*** *Total Life Cycla is the sum of annual costs in constent 1995 dollars.*

MONTICELLO PROJECTS



MONTICELLO PROJECTS

Monticello Projects consist of the Monticello Mill Tailings Site and the Monticello Vicinity Properties Site. The Monticello Mill Tailings Site is composed of three operable units: the mill site, a 110-acre acre tract located along Montezuma Creek, south of the City of Monticello, San Juan County, Utah; 23 peripheral properties located north and south of the mill site; and the surface and ground water located beneath the tailings piles. The Monticello Vicinity Properties Site encompasses 411 vicinity properties located outside the boundary of the Monticello Mill Tailings Site.

Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	19,890	30,520	26,020	24,650	16,170	26,290
Program Management	4,070	6,250	5,330	5,050	3,310	3,100
Total	23,960	36,770	31,350	29,700	19,480	29,390

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Environmental Restoration	22,275	0	0	0	0	0	0	133,650
Program Management	250	0	0	0	0	0	0	1,497
Total	22,525	0	0	0	0	0	0	135,148

** *Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

PAST, PRESENT, AND FUTURE MISSIONS

The mill was constructed in 1942 by the Vanadium Corporation of America with funds from the Defense Plant Corporation. The mill produced vanadium and a uranium-vanadium sludge for the Manhattan Project.

The Atomic Energy Commission bought the site in 1948. Uranium milling, the processing of uranium ore, commenced September 15, 1949, and continued until January 1, 1960, when the mill was permanently closed. Residues from uranium milling, known as mill tailings, were left in place at the millsite. The tailings piles at the millsite were stabilized and covered with soil in 1961 to limit their dispersal or use. Part of the land was transferred for a period of time to the Bureau of Land Management, but otherwise the site remained under the control of the Atomic Energy Commission and now the Department of Energy (DOE).

The mission of the Monticello Projects is to ensure that the environmental impacts associated with past activities at the site are identified and investigated and that appropriate action is taken to protect public health and welfare and the environment. The Grand Junction Projects Office is responsible for remediation of the Monticello Projects. The projects will be considered complete when all sites have been remediated to the extent specified in an agreement entered into by DOE, EPA, and the State of Utah under the Federal Facility Agreement and when waste generated in the remediation has been safely disposed.

Environmental Management will retain responsibility for surveillance and monitoring at all of the remediated areas as long as necessary to ensure adequate protection of human health and the environment. Future use of the existing Monticello millsite, following cleanup, has yet to be determined. The Monticello Site-Specific Advisory Board, along with other State, county, and city organizations, will participate in the analysis and decision of future land uses for the property during FY 1995.

ENVIRONMENTAL RESTORATION

Uranium mill tailings and by-product materials produced during uranium milling contaminated the millsite, peripheral properties and surface and ground water. Contamination also occurred in the City of Monticello from windblown materials and from the use of mill tailings as construction and fill materials. Although the process of milling recovers about 93 percent of the uranium, the tailings that remain contain several radioactive elements, including uranium, thorium, radium, polonium, and radon. The total volume of tailings, process related contaminated material, and tailings contaminated soil is estimated at 3 million cubic yards.

The remedial action project for the Monticello Mill Tailings Site has been divided into three operable units to differentiate between the affected tracts of land or the kinds of contamination. The selected remedial action for the project is established in the record of decision for the Monticello Mill Tailings Site.

Environmental Restoration Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	22,275	0	0	0	0	0	0	133,650

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Operable Unit I: Mill Tailings and Millsite Property

Operable Unit I includes the 78 acres of the original millsite. This land now houses the impoundments that contain the original mill tailings, the tailings removed from the Monticello peripheral properties (Operable Unit II), and the tailings removed from the Monticello vicinity properties. The tailings piles are within the flood plain of Montezuma Creek. They are also partially in contact with a shallow alluvial aquifer underlying the site.

The volume of contaminated material in the mill area is estimated at 100,000 cubic yards, and the volume of tailings, contaminated soil, by-product material, and contaminated building material in the tailings impoundments is estimated at approximately 1.4 million cubic yards (2 million tons).

For Operable Unit I, the selected remedial action is excavating the tailings at the millsite and hauling them, together with any other contaminated material, to a permanent repository south of the millsite. The repository is designed to permanently contain the estimated 2.6 million cubic yards of uranium/vanadium mill tailings that will be excavated from the millsite and other properties in the vicinity of Monticello, Utah. The repository will be lined with a combination of synthetic and natural liner materials to achieve compliance with minimum technological requirements established in the Resource Conservation and Recovery Act (RCRA) for containment of hazardous wastes in a landfill. After the placement of the tailings, the repository will be sealed with a water balance cover consisting of revegetated soil and a capillary break over a 60 millimeter thick polyethylene cover liner. Beneath the polyethylene layer will be an additional soil barrier to control radon emissions.

The millsite will be remediated to the standards specified in 40 CFR 192, Subpart A, for radium-226. For locations in which contamination is much higher than in the surrounding areas, cleanup will be based on the "hot-spot" criteria established for remedial actions at "formerly utilized sites" (i.e., sites used in the early stages of the nuclear weapons program). Standards for thorium, uranium, and heavy metals will be established through a risk assessment. Remediation for this operable unit is scheduled to be completed in FY 2000.

Operable Unit II: Peripheral Properties

The Monticello peripheral properties include DOE-owned and private land to the north and south of the old millsite land that had been leased for the stockpiling of ore and adjoining areas where contaminants were deposited by wind or surface water. A total of 25 properties covering approximately 300 acres around the site contain most of the estimated 300,000 cubic yards of peripheral property material requiring remediation. The peripheral properties also include the streambed and banks of a 3.3 mile length of Montezuma Creek extending from the millsite to the confluence of Montezuma and Vega Creeks.

The selected remedy for Operable Unit II is to remove contaminated tailings and to haul them to the tailings repository to be constructed south of the old millsite. For areas where tailings exist in and along the banks of Montezuma Creek, the cleanup will be based on the standards in 40 CFR 192, Subpart A, for radium-226 and the "hot-spot" criteria established for formerly utilized sites. The remedial action is scheduled for completion in FY 2000.

Operable Unit III: Surface Water and Ground Water

Operable Unit III includes all ground water beneath the tailings piles extending approximately 2 miles downstream. The volume of contaminated water is estimated at 163 acre feet (an acre foot is equivalent to 325,853 gallons). At present, this alluvial aquifer is not used as a private or public drinking water source and is separated from the deeper Burro Canyon aquifer by a rock formation known as the Dakota Sandstone. The Burro Canyon aquifer, which is being used for drinking water, has not been contaminated.

The surface water included in Unit III consists of Montezuma Creek, which flows through the millsite. Montezuma Creek is a small perennial stream with headwaters in the Abajo Mountains immediately west of Monticello.

Operable Unit III may include the remediation of peripheral properties in the canyon of Montezuma Creek. Cleanup standards, if required for the remediation of metals (including thorium and uranium) will be developed through a risk assessment. This additional remediation may be necessary to ensure the elimination of surface and ground water contamination in Montezuma Creek and the associated alluvial aquifer.

The remedial action for Operable Unit III has not yet been selected. The draft record of decision for the selected remediation of Monticello Surface and Ground-water Remedial Action Project is currently planned for FY 2000. The standards for cleanup will be based on analyses of costs and benefits applied to the potential impacts of ground-water contamination.

Monticello Vicinity Properties

The objective of the Monticello Vicinity Properties Project is to remediate the business and residential properties in the City of Monticello that are contaminated by windblown materials and by the use of mill tailings as construction and fill materials. The vicinity properties are included in the EPA's National Priorities List.

The selected remedy for vicinity properties is to remove the tailings and to haul them to the Monticello millsite for disposal with the millsite tailings. This remedy will be applied to an estimated 411 vicinity properties. The cleanup will be based on the standards in 40 CFR 192, Subpart A, for radium-226. For areas where tailings were deposited by wind, the "hot-spot" criteria established for formerly utilized sites will be used. Remediation of the Monticello vicinity properties is scheduled for completion in FY 1997.

WASTE MANAGEMENT

Waste management for the Monticello project is limited to the disposal of the uranium mill tailings and other contaminants that will be excavated from the various operable units. The costs for these activities and the repository in which the tailings will be stabilized are included in the estimated costs for environmental restoration.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

There are no nuclear material and facility stabilization activities currently being conducted at this site.

LANDLORD FUNCTIONS

Landlord activities for this site are managed out of the Grand Junction Projects Office. Please see this Colorado site summary for additional information.

PROGRAM MANAGEMENT

The Monticello Project has no separate funding for program management. All program management activities are performed within the environmental restoration activities. For the purposes of this report, 17 percent of the environmental restoration funding is allocated for the following program management activities. The necessary program management activities are included in the budget for environmental restoration activities shown in the Program Management Cost Estimate table.

Monthly city, county, and regulatory agency information and discussion meetings and Site-Specific Advisory Board meetings form the core of Grand Junction Project Office stakeholder and public participation activities. Additionally, ongoing communication and interaction is maintained with the communities in which the Grand Junction Project Office is managing environmental restoration programs through a Speakers Bureau, site tours, educational outreach programs, concentrating on the sciences and environmental topics, and the issuance of regular press releases to update project progress and future work schedules.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Monticello.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	250	0	0	0	0	0	0	1,497

* *Costs reflect a five-year average in constent 1995 dollars, except in FY 1995-2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Defense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Program Management	250	0	0	0	0	0	0	1,497

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Environmental Restoration	22,275	0	0	0	0	0	0	133,650

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

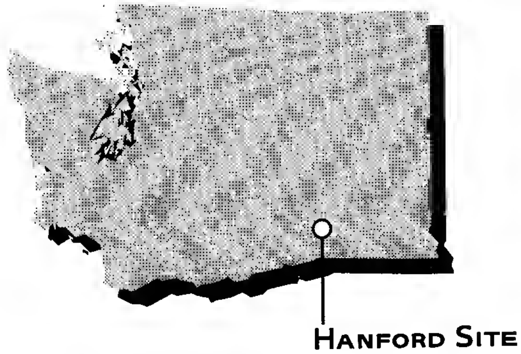
** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
Monticello Remedial Action Project	Complete Site Remediation & Reconstruction	FY 2000
Monticello Vicinity Properties	Complete Remedial Action	FY 1997
Monticello Surface and Ground Water	Issue Draft Record of Decision	FY 2000

For further information on this site, please contact:

	Public Participation Office	*(505) 845-5951*
	Public Affairs Office	*(505) 845-6202*
	Technical Liaison: Marilyn Bange	*(505) 845-5150*



WASHINGTON

Estimated State Total

*(Thousands of Current 1995 Dollars)**

	FY 1995	1996	1997	1998	1999	2000
Hanford	1,440,522	1,353,417	1,926,300	2,190,000	2,423,400	2,340,600

* *Costs for FY 1995 reflect Congrassional Approprietion, costs for FY 1996 raflect EM budget submission, costs for FY 1997-2000 raflect Budgat Shortfall Scenario, costs for shadad area assuma 3% annual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Hanford	1,791,097	1,920,824	1,741,852	1,608,698	1,431,569	1,636,315	1,498,239

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Hanford	1,179,364	901,380	387,388	95,923	36,906	22,240	0	73,050,072

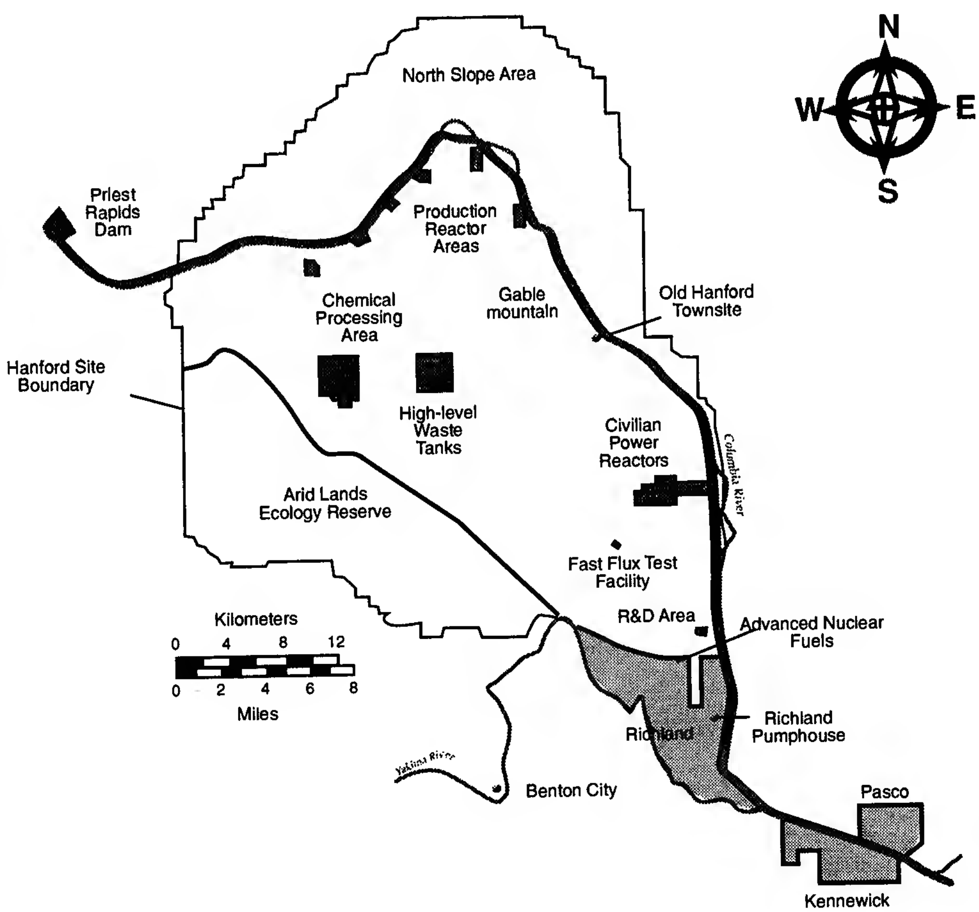
** *Costs reflect e five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

HANFORD SITE

The Hanford Site occupies approximately 560 square miles of arid steppe in the southeastern part of the State of Washington. The site is in an isolated, sparsely populated location near the Columbia River forming its eastern boundary. The nearest communities are Richland, at the southern border of the site; Kennewick, 15 miles to the southeast; and Pasco, 11 miles to the southeast. The Hanford Site consists of five operating areas.

The selection criteria for the site called for a large remote tract of land with room for a manufacturing area measuring at least 12 by 16 miles, space for laboratories at least 8 miles from the nearest reactor or processing plant, and abundant supplies of water and electricity. Hence, production reactors were located along the Columbia River (the 100 Area); chemical processing plants and associated facilities (e.g., waste tanks) were located on a plateau near the center of the Site (the 200 Area); and fuel-fabrication buildings, laboratories, and other support facilities were located near the site's southern boundary (the 300 Area). In 1967, part of the Hanford Site was designated an Arid Land Ecology Reserve by the Atomic Energy Commission.



Estimated Site Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Environmental Restoration	140,522	121,000	161,300	164,300	167,600	170,600
Waste Management	979,000	916,000	1,312,000	1,603,000	1,834,000	1,772,000
Nuclear Material and Facility Stabilization	186,000	187,000	211,000	171,700	174,800	153,000
Directly Appropriated Landlord	46,000	28,800	121,000	129,000	120,000	115,000
Program Management	89,000	100,617	121,000	122,000	127,000	130,000
Total	1,440,522	1,353,417	1,926,300	2,190,000	2,423,400	2,340,600

* Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenario, costs for shaded area assume 3% annual inflation.

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Environmental Restoration	142,745	150,037	162,694	174,817	170,141	157,446	179,463
Waste Management	1,288,334	1,131,376	971,716	922,448	788,683	969,374	851,219
Nuclear Material and Facility Stabilization	168,476	85,483	99,719	19,087	19,790	3,548	158
Directly Appropriated Landlord	85,314	109,467	109,467	109,467	109,467	109,467	109,467
Program Management	106,227	444,461	398,256	382,879	343,488	396,480	357,932
Total	1,791,097	1,920,824	1,741,852	1,608,698	1,431,569	1,636,315	1,498,239

	2035	2040	2045	2050	2055	2060	2065	Life Cycle***
Environmental Restoration	237,541	251,809	206,599	18,349	13,306	7,400	0	9,504,470
Waste Management	697,966	464,165	89,140	30,827	0	0	0	42,314,577
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	2,149,786
Directly Appropriated Landlord	18,588	18,588	18,588	18,593	18,600	12,840	0	4,324,881
Program Management	225,269	166,818	73,062	28,154	5,000	2,000	0	14,756,358
Total	1,179,364	901,380	387,388	95,923	36,906	22,240	0	73,050,072

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.

*** Total Life Cycle is the sum of Annual costs in constant 1995 dollars.

PAST, PRESENT, AND FUTURE MISSIONS

In January 1943, the U.S. Government selected the Columbia Basin as the location for the Nation's first full-sized plutonium production operations. Immediately after the site was acquired, the Government began building 3 reactors, 3 chemical processing plants (for recovering plutonium from irradiated fuel), and 64 underground waste storage tanks. A laboratory was built to support the fabrication of reactor fuel fabrication and other production activities. The plutonium produced at Hanford was used in the world's first nuclear weapons.

A major expansion program was started in the late 1940's to increase the Nation's plutonium production. From 1947 to 1955, some 15,000 workers built 5 additional plutonium production reactors, 2 additional chemical processing plants, 1 plutonium finishing plant, and 81 additional underground waste storage tanks. A ninth reactor, the N-Reactor, was built between 1959 and 1963. Unlike the preceding eight reactors, whose sole purpose was producing plutonium, the N-Reactor also produced steam for the generation of electricity.

In the 1960's, though the main mission remained the same, Hanford's activities saw dramatic changes. Plutonium production was sharply curtailed. By 1971, eight of the nine production reactors had been shut down. By 1972, all related chemical processing facilities, including the Plutonium-Uranium Extraction Plant, had ceased operation. The Plutonium-Uranium Extraction Plant and the Uranium Oxide Plant were restarted for a brief production period in the early 1980's, but the plants are now permanently shut down. With these developments, Hanford's resources and capabilities were redirected toward nonmilitary applications of nuclear energy; solar, geothermal, and fossil energy; and energy conservation. During this period, a full-sized advanced test reactor, the Fast Flux Test Facility, and the Fuels and Materials Examination Facility were added in the 400 Area for large-scale nuclear fuels testing in support of nuclear energy research.

Plutonium production at Hanford ended in 1989. Although energy-related research will continue at the site for the Department of Energy (DOE) Office of Energy Research, the primary mission now and for the foreseeable future is environmental management. The landlord at the Hanford Site is Environmental Management.

ENVIRONMENTAL RESTORATION

Environmental Contamination

Early Hanford planners thought waste cleanup would start in the peaceful years expected immediately after World War II. What followed, however, was the Cold War and an arms race continuing for decades. Plutonium production was always the top priority, and not until the late 1980's did environmental management finally receive serious consideration. As a result, radioactive and chemically hazardous waste has been accumulating at Hanford since 1943. It accounts for approximately two-thirds of all the nuclear waste, by volume, in the DOE complex.

Environmental contamination, that is, the presence in soil or ground water of radioactive materials or hazardous chemicals above established limits, is present in most areas of the Hanford Site. It is not within well defined boundaries and is generally the result of past liquid waste discharges. Depending on the location, the primary contaminants are tritium, carbon tetrachloride, chromium, nitrates, cobalt, strontium, cesium, technetium, iodine, plutonium, and uranium. The total estimated volumes of contaminated soil and ground

water are very large, about 64 million cubic meters and 2.7 billion cubic meters, respectively. The site-wide ground-water plume containing tritium, iodine, and nitrates comprises the largest part of the estimated volume, 2.7 billion cubic meters.

Tritium, the most common radioactive contaminant in the soil and the ground water at Hanford, is concentrated in places, especially near reactor sites and chemical processing areas. It moves freely, but the amounts reaching the Columbia River become so diluted they are no longer hazardous. Tritium levels in the Columbia River are comparable to those occurring naturally in Oregon and western Washington. And since tritium's radioactive half-life is about 12 years, its radioactivity has already diminished significantly and will virtually disappear in approximately 100 years. Nitrates, from chemical processing, are the most common chemical contaminant. They are usually found in combination with other chemicals.

In October 1989, the Hanford Site was placed on the National Priorities List under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Environmental Restoration Projects

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
100 Area	30,967	100,131	120,093	120,449	108,436	65,061	0
1100 Area	1,033	0	0	0	0	0	0
200 Area - East	2,849	0	0	0	0	43,374	43,374
200 Area - West	7,825	0	0	0	0	0	65,062
300 Area	13,514	8,305	0	0	0	0	23,856
Environmental Restoration Disposal Facility (ERDF)	26,365	10,236	10,236	12,236	12,236	10,236	10,236
Facility Decommissioning	51,637	26,851	27,851	37,618	44,955	34,260	32,421
Long-Term Surveillance and Monitoring	163	227	227	227	227	227	227
Site-Wide Activities	8,390	4,287	4,287	4,287	4,287	4,287	4,287
Total	142,745	150,037	162,694	174,817	170,141	157,446	179,463

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
100 Area	30,400	38,000	7,600	0	0	0	0	3,136,654
1100 Area	0	0	0	0	0	0	0	6,199
200 Area - East	26,025	97,592	71,568	0	0	0	0	1,426,762
200 Area - West	82,411	47,712	13,012	0	0	0	0	1,087,933
300 Area	43,374	0	0	0	0	0	0	458,762
Environmental Restoration Disposal Facility (ERDF)	10,236	10,236	10,236	4,094	0	0	0	659,287
Facility Decommissioning	40,581	42,911	32,266	12,449	13,306	7,400	0	2,074,159
Long-Term Surveillance and Monitoring	227	227	227	91	0	0	0	11,647
Site-Wide Activities	4,287	15,131	71,690	1,715	0	0	0	643,065
Total	237,541	251,809	206,599	18,349	13,306	7,400	0	9,504,470

* *Costs reflect a five-year average in constant 1995 dollars, except in FY 2000, which is a six-year average.*

** *Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Hanford's waste is found in at least 1,391 locations across the site. Of these, about 10 percent contain radioactive waste, about 10 percent contain chemically hazardous waste, 12 percent contain nonhazardous waste, and 75 percent contain mixed radioactive and hazardous waste. These percentages may change as the site is further assessed. Also, billions of liters of liquids were discharged to the soil. The full extent of soil contamination is not known yet, but about 200 square miles of ground water are contaminated. In most cases, however, the contamination does not exceed drinking-water standards and, hence, is not considered to be as serious a problem as other problems that Hanford faces.

The chemical processing of irradiated fuels generated the largest portion of Hanford's waste volumes. The resulting high-level radioactive waste was an alkaline slurry containing heavy metals, organic and inorganic salts, uranium, plutonium, and mixed fission products. It was piped into underground tanks for storage. Other waste streams from processing (e.g., cooling water and condensates) were discharged to the ground. Fuel fabrication and irradiation activities produced large and concentrated volumes of waste as well.

Approximately 350 million liters of waste were pumped into 149 single-shell tanks between 1944 and 1980.

Sixty-six of the single-shell tanks may have leaked as much as 3.8 million liters or more of waste into the nearby soil. Most of the waste from these tanks has remained trapped in the surrounding soil. It is not believed these leaks pose any immediate risk to workers or the environment, specifically the ground water.

The reactors and the chemical processing plants used large amounts of Columbia River water. Ponds and cribs were commonly used to dispose of these liquid waste, which were mostly clean or contained only small amounts of chemicals or radioactivity. Most of these contaminants were trapped and are still held by the soil. The ponds, some of which were as large as 80 acres, generally received the cleanest waste streams, clean enough to meet drinking-water standards. The cribs were underground structures into which radioactive liquid effluents were discharged to allow radionuclides to filter slowly through the soils above the ground water. At Hanford, cribs were the most common means for the disposal of slightly radioactive liquid waste. This practice was widespread because the site's soils were thought to filter and trap radioactive materials, allowing much of the material to decay before reaching the ground water. Unfortunately, not all of the contaminants were trapped. Large amounts of contaminated sediments did migrate downward from the cribs, and some contaminants have been found in the ground water. About 454 million liters of low-level wastewater was diverted to cribs from single-shell tanks for disposal.

Disposal of wastewater resulted in the contamination of both soil and ground water. The natural direction for ground-water flow generally is from west to east, toward the Columbia River. In most cases, however, samples show much of the ground water outside this area meets or exceeds drinking-water quality standards.

For several years in the late 1940's and early 1950's, some wastewaters were discharged directly into the ground through 11 deep wells known as reverse wells. One was approximately 90 meters deep and reached the ground water. They now contain an estimated 250 cubic meters of contaminated sediments. The 67 french drains at the Hanford Site are a much shallower version (about 3 meters deep) of the reverse wells and function like small cribs with coarse rock or gravel in the bottom.

Assumptions About Future Use and Remediation Goals

The Hanford Site has been divided into six geographical areas for cleanup purposes: the Hanford reach of the Columbia River; the reactors on the Columbia River (100 Area); the Central Plateau (200 Area); the 1100 Area including the Arid Land Ecology Reserve; areas north of the river (North Slope); and all other areas (including the 300, 400, and 600 Areas). Remediation alternatives have been defined. They are based on two remediation goals and cleanup scenarios developed by the Hanford Future Site Uses Working Group.

The two remediation goals are defined as follows:

- Unrestricted land use: Contamination does not preclude any human uses. However, access or certain uses may be prohibited for other reasons (i.e., physical hazards or environmental sensitivity).
- Restricted land use: Access to a particular area is limited because of potential risk. An example is an excluded area to be used only for the management or disposal of radioactive and hazardous materials, with control maintained by DOE.

The cleanup scenarios call for all other geographical areas, except the Central Plateau (200 Area), to be remediated for unrestricted land use. The Central Plateau would be left for restricted uses because it is the site for ongoing waste management activities. Other waste sites in the 200 Area will be remediated in place through the use of barrier technology. A continual monitoring program will be in effect.

The areas adjoining the Columbia River would be remediated for unrestricted use. This means minimizing the amount of chromium and strontium entering the river and also reducing ground-water contamination. Both the Arid Land Ecology Reserve and the North Slope have already been remediated for unrestricted land use. The remediations were completed in FY 1994.

Restoration of the 100 Area

The 100 Area encompasses six reactor areas with nine former production reactors, many inactive support structures, and former waste disposal sites. According to the cleanup scenarios, this area would be remediated for unrestricted land use. The environmental remediation will be finished in 2043, with total cleanup (including the decommissioning of the reactors and other structures) completed by 2032. The estimated cost represents 40 percent of the total environmental restoration cost at Hanford.

To clean up the 100 Area, 9 reactor buildings and 148 reactor-related facilities will be demolished; millions of cubic yards of soil will be excavated and moved to disposal facilities.

When the reactors are demolished, the reactor blocks (each weighing 10,000 to 20,000 tons) will be transported roughly 10 to 15 miles to a Reactor-Block Disposal Facility on the Central Plateau. Virtually all contaminated soil will be excavated and disposed of at the Environmental Restoration Disposal Facility on the Central Plateau (the 200 Area). Landfills for contaminated waste (protective clothing, tools, used parts discarded during maintenance, and scrapped equipment) will also be excavated and transported to a disposal facility on the Central Plateau. Ground water contaminated through the discharge of contaminated reactor cooling water to seepage pits near each of the reactors will be pumped from wells and treated. The treated water will be returned to the aquifer.

Before demolishing any facilities, the nature and extent of the contamination inside the structures must be assessed to protect the health and safety of the workers, to prevent the further spread of contamination to the environment during demolition, and to maximize the amount of

material to be recycled or discarded in comparatively inexpensive "construction-debris" landfills. Contaminated demolition debris will be disposed of in the Environmental Restoration Disposal Facility.

The facilities in the 100 Area to be assessed, decontaminated, and demolished are roughly equivalent in area to 50 football fields. Since these are industrial facilities, there are also miles of pipe, conduit, and wire and thousands of tons of mechanical and electrical equipment to be removed.

Field investigations to sample and analyze contaminated soils and waste, preliminary assessments of environmental risks to identify high priority sites, and engineering evaluations to determine appropriate remediation techniques will be completed for most contaminated soil and solid waste sites by the end of FY 1995. Field tests to evaluate specific cleanup technologies will also be conducted. They include the excavation of solid waste from a burial ground, the removal and treatment of chromium-contaminated ground water, and the excavation and "washing" of soils to reduce the volume of contaminated soil. These tests will be largely completed by the end of FY 1995 except for soil washing, which will be continued in FY 1996.

Records of decision for most high priority sites are expected by the end of FY 1995. Remedial design for the final cleanup of high priority sites at three reactor areas will begin in late FY 1995 and for the other three reactor areas in FY 1996. Cleanup will start first at the 100-BC Reactor area in late FY 1995. Remediation of the soil will be completed in the year 2023.

Restoration of the Central Plateau

Restoration of the Central Plateau (the 200 Area) is planned to be complete by 2047, including decommissioning activities. The Central Plateau is the only geographical area at Hanford not to be remediated for unrestricted use. However, its remediation will be a major effort, with 817 waste sites to be contained, 44 facilities to be demolished, billions of gallons of contaminated ground water, and 60,000 cubic yards of transuranic waste. Its cost will represent 40 percent of the total environmental restoration cost at Hanford.

The 817 waste sites in this area total nearly 10,000 acres. They include many landfills containing contaminated protective clothing, tools, and equipment used during the fabrication of nuclear fuels. Low-level waste would be disposed in situ using appropriate barrier technology. For the purposes of this estimate transuranic waste was assumed to be exhumed. Following risk assessments, it may be considered impractical to remove much of the transuranic waste because it is so extensive, and retrieval or removal activities could pose unnecessary hazards to workers, while posing little real risk to the surrounding public. In place of excavation and disposal, engineered barriers might be used, which are designed to prevent water and animals from reaching and spreading the contamination. Current plans for ground water are to selectively remove mass contamination by pumping ground water to the surface, treating it, and then returning it to the aquifer.

For estimating costs, it was assumed that the buildings in this area would have their equipment removed, undergo surface decontamination, be demolished, collapsed with the rubble, capped, and monitored.

Restoration of the 300 Area

Restoration of the 300 area, including decommissioning activities, is expected to be complete by 2035, with most of the work occurring between 2030 and 2035. To clean up this area, 90 waste sites must be excavated, including 5 million cubic yards of soil, with 2.7 million cubic yards of soil transported to disposal facilities. In addition, 2,000 cubic yards of transuranic waste must be packaged and

moved to the Central Plateau for retrievable storage until it can be shipped to the Waste Isolation Pilot Plant in New Mexico. The estimated cost represents 7 percent of the total environmental restoration cost for Hanford.

The soil and ground-water contamination in this area resulted mainly from liquid and solid waste discharges during the fabrication of nuclear fuels. Except for the transuranic waste, the characteristics of the waste sites and the cleanup remedies closely parallel those for the 100 Area. For this Baseline Report, it was assumed the 300 Area buildings will have their equipment removed, undergo surface decontamination, and be demolished, with the rubble removed to another area.

The present strategy for the ground water in the 300 Area is to monitor the ground water to determine whether contaminants are spreading. It is expected the ground-water contamination in the 300 Area will be found to pose no threat to the Columbia River or other aquifers.

Restoration of the 1100 Area

The 1100 Area cleanup includes the Arid Lands Ecology Reserve, the largest research natural area in the State of Washington, and one of the few remaining large tracts of shrub steppe vegetation. Cleanup efforts were completed on the Arid Lands Ecology Reserve in 1994. The 1100 Area Cleanup is planned to be complete in 1995; funding accounts for less than 1 percent of the total Hanford cleanup cost.

Other waste sites include hazardous waste staging areas, storage yards, and various tanks and pits used in past equipment maintenance activities. These activities are complete or will be complete by the end of FY 1995. Ground-water monitoring and analysis at the Horn Rapids landfill, located near the most northern point of the Yakima River on the site map, will also be complete by the end of FY 1995. All other areas (300, 400, and 1100 Areas) would be remediated to meet the industrial land use scenario.

Radiation Area Maintenance

Contaminated waste sites are potential health and safety hazards to Hanford workers and the surrounding community. Contamination can potentially be spread for miles if windblown dust and vegetation (primarily tumbleweeds) are not controlled. The maintenance activities include:

- responsibility for 582 square miles, the total Hanford site;
- surveillance and maintenance of 400 waste sites;
- vegetation control for 4,600 acres per year;
- stabilization of 1,400 acres for radioactive surface contamination; and
- 3 percent of total environmental restoration cleanup costs.

To control these risks, surveillance and maintenance will continue for each waste site pending final remedial action. The surveillance and maintenance activities consist of quarterly surveillance and inspection, routine radiological surveys, a minimum of annual herbicide applications, removal of deep rooted vegetation and routine corrective actions to control remaining areas of surface contamination and the repair or barricading of hazardous areas to meet minimum safety criteria.

Vegetation management and interim stabilization are significant activities of the safety maintenance program. Interim stabilization is the term used to describe the activities required to prevent the spread of radioactive surface contamination from individual waste sites. Interim stabilization

activities should be complete in FY 1997. A priority ranking system has been used to evaluate risks and determine the order in which individual sites will be stabilized. Surveillance and maintenance activities will continue through the completion of waste site remediation currently planned for the year 2050. Annualized surveillance and maintenance costs will continue as long as the site is occupied.

Decommissioning Activities

Surplus facilities at the Hanford Site will require decommissioning. The majority of surplus facilities at Hanford are located in the 100 and 200 areas and consist of shutdown reactors, chemical separation and processing plants, waste handling facilities, and support structures. A site-wide asbestos abatement program will also be conducted in preparation for the decommissioning process. Decommissioning activities will initiate in 2002 and are scheduled to be complete in 2057.

During FY 1993, the Richland Operations Office implemented an Agreement-In-Principle to accelerate decommissioning activities at the Hanford Site. The Agreement-In-Principle is aimed at reducing the number of potential safety hazards, reduce surveillance and maintenance costs, and demonstrate meaningful cleanup progress.

Shutdown Reactors

All 9 production reactors were constructed in the 100 Area along the Columbia River in the northern part of the Hanford Site. With the exception of the N-reactor, all were shutdown by 1971. The N-reactor was placed on standby in 1988. In March 1989, Hanford drafted an environmental impact statement for the eight reactors scheduled for cleanup (all but N-reactor). These reactors are contaminated with radioactivity and hazardous material. The decommissioning sequence for the reactors is described in the Restoration of the 100 Areas section. Decommissioning activities for the reactors (not including the Reactor Block Facility) are scheduled to be complete in 2043.

In addition to the production reactors, a test breeder reactor, the Fast Flux Test Facility, was constructed in the 400 Area. This 400 megawatt sodium cooled test reactor began full power operation in 1982 and conducted fuel, materials, isotope, and power experiments. Decommissioning activities for the Fast Flux Test Facility (not including the Reactor Block Facility) are scheduled to be complete in 2017.

Chemical Separation and Processing Plants

Overall, Hanford has constructed 10 chemical processing plants on the plateau in the 200 Area, and all were operational by the late 1950's. These 800-foot-long canyon buildings were used to separate plutonium from uranium target material through the bismuth phosphate process.

The processing buildings include the Plutonium Uranium Extraction Plant, where spent fuel was processed to extract plutonium and unused uranium; the Uranium-Oxide Plant, to convert uranium nitrate to uranium oxide powder for recycling; and the Plutonium Finishing Plant (PFP or Z-Plant) where plutonium metal was fashioned. In addition, Hanford had the use of B-Plant for the bismuth phosphate processing, and to separate and purify cesium and strontium for encapsulation; C-Plant (Strontium Semiworks) for separation and process development; S-Plant, for separation through solvent extraction; T-Plant for bismuth phosphate process separation, and subsequently as a decontamination and repair facility; and U-Plant for chemical separation and processing.

Plutonium production at Hanford ended in 1989, with the Plutonium Uranium Extraction Plant and the Uranium-Oxide Plant ceasing

operations in 1992 and 1993, respectively. As a result of waste management activities, the Plutonium Finishing Plant may have to be reactivated. These processing plants are contaminated by both radioactivity and hazardous materials. Decommissioning will require decontamination, removal of equipment, and demolition of structures with no further mission. At present, new missions are assigned to two processing plants; T-Plant is serving as a decontamination facility, and B-Plant is serving as a storage facility. The decommissioning sequence for the surplus processing plants is described in the Restoration of the Central Plateau (200 Area) section. Decommissioning activities for the chemical separation and processing plants are scheduled to be complete in 2057.

Waste-Handling Facilities

There are 149 single-shell and 28 double-shell tanks storing high-level waste in the 200 Area. These tanks and associated waste treatment and handling facilities are described in the Waste Management section. Decommissioning activities for the high-level waste handling facilities are scheduled to be complete in 2057.

The K-Basins in the 100 Area provide storage for spent fuel. The problems at the K-Basins are described in the Waste Management/Spent Nuclear Fuel Storage section. Decommissioning activities for the K-Basins are scheduled to be complete in 2016.

Several facilities are scheduled to process and treat low-level waste, low-level mixed waste, and transuranic waste. Decommissioning activities for these facilities are scheduled to be complete in 2057.

A Reactor-block Disposal Facility will be excavated on the Central Plateau. Decommissioning activities for the Reactor-block Disposal Facility are scheduled to be complete in 2050. An Environmental Restoration Disposal Facility will also be constructed on the Central Plateau for the disposition of contaminated soil. Decommissioning activities for the Environmental Restoration Disposal Facility are scheduled to be complete in 2057.

Support Structures

The 300 Area originally fabricated fuel elements for the production reactors. Currently, the area houses laboratories, technical shops, and engineering offices for research and development work. At present, the 300 Area facilities associated with the continuing function of the Multi-Program Laboratory are not counted as surplus. The 1100 Area, located in the southern part of the site, performs vehicle maintenance and general warehousing operations. The decommissioning sequence for the support structures are described in the Restoration of the 300 Areas and Restoration of the 1100 Ares sections. Some facilities will be decontaminated, released, and revitalized if economically justified. Decommissioning activities for the support facilities are scheduled to be complete in 2021.

Asbestos Abatement

Asbestos abatement is a site-wide program to remove asbestos from all facilities currently posing a hazard to occupants and to remove asbestos prior to surplus facilities demolition. The near-term focus is on occupied facilities that represent high asbestos-exposure risks. Priority 'A' is used to designate occupied facilities with friable asbestos that has been damaged and is accessible. Priority 'B' is used to designate occupied facilities with friable asbestos that is not damaged or accessible. Abandoned facilities are designated priority 'C'. By the end of FY 1998, all 29 high-priority (priority 'A' and 'B') sites will be completed. Beginning in FY 1999, the focus of the asbestos abatement program will shift to the removal of

asbestos from the reactors and surplus facilities in the 100 and 200 Areas prior to their demolition. Asbestos abatement activities are scheduled to be complete in 2048.

Postclosure Surveillance and Maintenance

Some waste sites are remediated in place. The engineered covers described for 200 Area waste sites are the primary example of this remediation strategy. Postclosure surveillance and maintenance involves periodic visits to the sites to check on the integrity of the cover. This activity is planned to the year 2047. The postclosure surveillance and maintenance activities represent one tenth of one percent of total environmental restoration cleanup costs.

Environmental Restoration Disposal Facility

The Environmental Restoration Waste Disposal Facility is located on a portion of the land between the 200 East and the 200 West Areas. This facility will be used for disposal of the low-level radioactive waste and hazardous waste from the environmental restoration program cleanup of the Hanford Site. The majority of this waste is contaminated soil and construction rubble. Construction of the first phase of the Environmental Restoration Disposal Facility will start in 1995 and be completed in July 1996, and the facility will be fully operational by October 1, 1996. The facility will then receive waste continuously for the following 50 years. Facility construction has been developed based on the following measures with the resulting cost factor:

- 14 million cubic yards of waste capacity,
- 1,000-year minimum design life, and
- 7 percent of total environmental restoration cleanup cost.

The location for the disposal facility was selected because it is geologically stable, located outside of the 100 year flood plain, distant (over seven miles) from the Columbia River, far from the water table (240 feet), and located adjacent to lands not planned to be recovered for public use in the foreseeable future.

The disposal capacity of this facility will be constructed in phases to ensure the capacity will match the final volume of waste. The first phase of construction will store 1 million cubic yards.

To ensure the safe isolation of the waste to be deposited, the facility must be well engineered. The risk is rain water and snow melt will enter the contaminated soil and spread the contamination. To prevent this occurrence, RCRA requires a double liner beneath the contaminated material and a collection system between the liners to detect and collect any leaking liquid passing the first liner. As portions of the facility are filled, a cover is constructed over the top of the contaminated waste. The top cover is designed to conduct water away from the contaminated soil and prevent any spread of contaminants. The costs for the facility also includes the equipment, offices, staff, and decontamination facilities necessary for approximately 50 years of operation.

WASTE MANAGEMENT

The waste management program accounts for the majority of Life Cycle costs at Hanford. Much of the emphasis is placed on tank waste, which when processed will ultimately yield vitrified high-level and low-level waste fractions. Waste management programs at Hanford are divided into five key areas: (1) the

Environmental Restoration Activity Costs

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
100 Area							
Assessment	3,877	0	0	0	0	0	0
Remedial Actions	27,090	100,131	120,093	120,449	108,436	65,061	0
Facility Decommissioning	0	0	0	0	0	0	0
1100 Area							
Remedial Actions	1,033	0	0	0	0	0	0
200 Area - East							
Assessment	477	0	0	0	0	0	0
Remedial Actions	2,372	0	0	0	0	43,374	43,374
300 Area							
Assessment	532	0	0	0	0	0	0
Remedial Actions	12,982	8,305	0	0	0	0	23,856
Environmental Restoration Disposal Facility (ERDF)	26,365	10,236	10,236	12,236	12,236	10,236	10,236
Facility Decommissioning							
Assessment	9,636	0	0	0	0	0	0
Facility Decommissioning	42,002	26,851	27,851	37,618	44,955	34,260	32,421
Long-Term Surveillance and Monitoring							
Long-Term Surveillance and Monitoring	163	227	227	227	227	227	227
Site-Wide Activities							
Assessment	1,882	0	0	0	0	0	0
Remedial Actions	6,509	4,287	4,287	4,287	4,287	4,287	4,287
Total	142,745	150,037	162,694	174,817	170,141	157,446	179,463

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
100 Area								
Assessment	0	0	0	0	0	0	0	23,263
Remedial Actions	0	0	0	0	0	0	0	2,733,391
Facility Decommissioning	30,400	38,000	7,600	0	0	0	0	380,000
1100 Area								
Remedial Actions	0	0	0	0	0	0	0	6,199
200 Area - East								
Assessment	0	0	0	0	0	0	0	2,863
Remedial Actions	26,025	97,592	71,568	0	0	0	0	1,423,899
200 Area - West								
Assessment	0	47,712	0	0	0	0	0	245,260
Remedial Actions	82,411	0	13,012	0	0	0	0	842,674
300 Area								
Assessment	0	0	0	0	0	0	0	3,192
Remedial Actions	43,374	0	0	0	0	0	0	455,571
Environmental Restoration Disposal Facility (ERDF)								
Environmental Restoration TSD	10,236	10,236	10,236	4,094	0	0	0	659,287
Facility Decommissioning								
Assessment	0	0	0	0	0	0	0	57,814
Facility Decommissioning	40,581	42,911	32,266	12,449	13,306	7,400	0	2,016,346
Long-Term Surveillance and Monitoring								
Long-Term Surveillance and Monitoring	227	227	227	91	0	0	0	11,647
Site-Wide Activities								
Assessment	0	0	0	0	0	0	0	11,292
Remedial Actions	4,287	15,131	71,690	1,715	0	0	0	631,773
Total	237,541	251,809	206,599	18,349	13,306	7,400	0	9,504,470

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Tank Waste Remediation System program managing high-level waste, (2) spent nuclear fuel storage at the K-Basins and other locations, (3) cesium and strontium capsule management at the Waste Encapsulation and Storage Facility at B-Plant, (4) liquid waste management, and (5) solid waste management. Each waste management program is described in the following sections with regard to treatment, storage and handling, and disposal activities.

High-Level Waste Tanks

Approximately 350 million liters of waste were put into single-shell tanks from Hanford Site Processes between 1944 and 1980. The tanks currently hold about 230 million liters of waste, including low-level, hazardous, or plutonium-contaminated salt cake and sludge. Most of it is now solid, though pockets of liquids and semi-liquid also are in the tanks. Sixty-six of the 149 single-shell tanks may have leaked as much as 3.8 million liters or more of waste into the nearby soil. In addition to the single-shelled tanks, there are newer double-shell tanks holding about 90 million liters of liquid radioactive, hazardous waste. The first of these tanks was put in use in 1971. No double-shell tanks have leaked to date.

The tanks now contain a mixture of salt cake, liquid, and sludges with both radioactive and hazardous components. Sludge consists primarily of solids (hydrous metal oxides) precipitated from the neutralization of acid waste. Salt cake consists of the various salts formed from the evaporation of water from the waste. Liquids exist as supernatant (liquid above solids) and interstitial liquid (liquid filling the void between solids) in the tanks. There waste types do not necessarily exist as discrete layers, but are intermingled to different degrees. Some sludges and salt cake may contain interstitial liquids and be relatively soft, while others are drier and harder.

The tank waste is mostly inorganic. It consists primarily of sodium hydroxide; sodium salts of nitrate, nitrite, carbonate, aluminate, and phosphate; and hydrous oxides of aluminum, iron, and manganese. The radioactive components consist primarily of mixed long lived fission product radionuclides such as strontium-90; cesium-137; and elements such as uranium, plutonium, and americium. Complexed waste contains the chelating agents EDTA and HEDTA. There may also be detectable halogenated and nonhalogenated

Major Waste Management Projects

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
TWRS Characterization	126,508	206,890	250,240	248,030	146,030	47,090	1,190	5,256,400
TWRS HLW (Vitrification)	37,967	283,730	235,110	255,850	253,300	250,750	242,930	7,836,150
TWRS LLW (Vitrification)	79,192	171,020	244,120	247,690	225,590	324,360	5,610	6,567,100
TWRS Operations, Maintenance	195,925	162,010	136,510	121,550	110,500	97,580	55,250	4,592,550
TWRS Tank Farm Upgrade	159,092	107,294	0	0	0	0	0	1,491,021
TWRS Waste Pre-Treatment	102,425	143,480	138,040	122,060	120,190	13,430	0	3,300,550

* Costs reflect a five-yeer average in constant 1995 dollars, except in FY 1995 - 2000, which is e six-year averege.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

NOTE: These projects represent a subset of waste management activities. Associated progrem management costs ere built-in to the estimates provided.

organic compound contamination. The mixed waste in some tanks may have detectable amounts of heavy metals such as lead, chromium, and cadmium.

Chemical processing activities in the 200 East and 200 West areas designed to separate plutonium from spent nuclear fuel generated the majority of waste stored in the high-level underground storage tanks. The tanks contain radioactive slurries generated by one of the following processes: the bismuth phosphate process, the tributyl phosphate process, the reduction oxidation process, the plutonium-uranium extraction process, and the B-Plant waste fractionation process. Other tank waste was generated in smaller volumes from research and development programs, laboratory processes, and Plutonium Finishing Plant operations.

All of the fuel processing methods generated acidic waste streams. Sodium hydroxide or calcium carbonate was added to the waste before being transferred to the tanks to neutralize the acid, minimizing tank corrosion. The tanks currently contain moderately to strongly alkaline solutions. Additional post-processing of some of the waste to recover plutonium and uranium, or to reduce the volume of high-level waste, has resulted in the addition of ferrocyanide and some organic compounds listed as hazardous.

In addition to the major processes listed above, the following installations have also generated waste streams:

- C Plant (Hot or Strontium Semiworks). A pilot plant for chemical separation processes and equipment development, C Plant was retired in 1967. A small amount of waste was generated totaling 3.04 million liters (803,000 gal); however, the waste is typically high in strontium content.

- Vaults. Several smaller waste treatment facilities, known as vaults, were built near the tank farms to settle, evaporate, neutralize and condition plant waste to reduce the waste volumes directed to the tanks and to make the waste alkaline to minimize corrosion. Vault configurations vary, but generally consist of a segmented, underground, concrete structure with a steel tank in each segment interconnected with piping. Equipment is accessed through concrete cover blocks at ground level. The vaults adjoin the related tank farms and processing plants with AR, BSR, and CR Vaults in 200 East, and TXR, UR, and WR Vaults in 200 West areas.

- Miscellaneous Past Sources and Waste. There are various other sources of waste, as well as other material added to the tanks. Some waste is from the 300 Area, 100 Area production reactors, various laboratories, and catch tanks. Unique additions to the waste included laboratory waste; shroud tubes; ceramic balls; experimental fuel elements; and relatively small amounts of enriched uranium, plutonium, cobalt-60, and natural uranium. Also, diatomaceous earth was added to Tanks BX-102, SX-113, TY-106, TX-116, TX-117, and U-104 to absorb residual supernatant liquors. For the same reason, type 2 Portland cement was added to Tank BX-105 in 1966. Miscellaneous waste streams include: Hanford defense residual liquor, Hanford laboratory operations, filtered Hanford Site water, phosphate decontamination waste from N-reactor, and noncomplexed waste.

The double-shell tanks continue to receive waste generated by decommissioning and cleanup operations in the 100, 200, 300, and 400 Areas. Hanford High-Level Waste Inventories are summarized on page WA 17. Waste streams continue to be directed to the double-shell tanks and are identified as: effluents associated with implementing the deactivation program for the Plutonium-Uranium Extraction Plant, as well as, routine maintenance and operations; waste from B Plant maintenance activities and condensate; T Plant, laboratory waste from the 222-S Laboratory in the 200 West Area and the 300 Area laboratories; miscellaneous waste streams from ion exchange resin regeneration; and equipment flush water.

Using a systems approach, waste management activities for tank waste at Hanford have been defined as the tank waste remediation system.

For the purpose of this analysis, seven separate programs describe tank waste remediation system activities: pretreatment; low-level waste (vitrification); high-level waste (vitrification) characterization and waste retrieval; operations, maintenance and safety; tank farm upgrades; and high-level waste disposal. Each of these programs are discussed below within the appropriate treatment, storage, or disposal section.

Solid Waste Overview

The solid waste streams are generally all the solid materials, containerized liquids, or semi-solid materials generated in the course of all operations at the Hanford Site not identified as Nuclear Material, Tank Waste, or Liquid Waste categories. In addition, permission has been granted for some solid waste to come from other sites in the Department's complex to Hanford. The primary waste source is stored waste retrieval. Considerable inventories of radioactive and mixed waste have been accumulating in trenches, caissons, and buildings at Hanford since 1970. These waste will be retrieved for appropriate treatment as facilities become available.

Solid wastes are classified as transuranic, low-level, low-level mixed, hazardous, and sanitary wastes. Each waste stream is managed under different regulatory and Departmental requirements. Hazardous and sanitary wastes are handled by a combination of onsite and offsite capabilities.

Waste Treatment

High-Level Waste Treatment

High-level waste treatment at Hanford is a subset of the tank waste remediation system. Four programs are described below. These programs are designed to: characterize and remove wastes, separate wastes into high-level and low-level waste fractions, and separately vitrify the high-level and low-level wastes for subsequent storage and disposal.

Tank Waste Remediation System Characterization and Waste Retrieval

The objective of the characterization program is to provide tank waste characterization data in a timely and cost-effective manner to support resolution of safety issues, ongoing operations, and tank waste disposal.

The program is currently establishing and implementing the data quality objectives process and increasing sampling and analytical laboratory capabilities. In addition to actual tank sampling, the program is utilizing historical tank waste characterization

Hanford Site High-Level Waste Volumes

TANK FARMS WASTES	HIGH-LEVEL WASTE GENERATION TOTALS	PERCENT CONTRIBUTION TO TOTAL
Liquid	25,100 cubic meters	9.6%
Sludge	46,000 cubic meters	17.8%
Salt Cake	93,000 cubic meters	35.9%
Slurry	94,700 cubic meters	36.6%
Total:	258,800 cubic meters	100%

Source: Integrated Data Base for 1993: U.S. Spent Fuel and Radioactive Waste Inventories, Projections, end Characteristics; March 1994 (DOE/RW-0006, Rev. 9).

information where available. The results of the analysis of each tank is issued in a tank characterization report, as well as input to the local electronic database. The current baseline calls for the issuance of tank characterization reports for all 177 Hanford waste tanks by September 1999.

The objective of the waste retrieval program is to remove waste from aging single-shell tanks and transfer the waste to double-shell tanks, mobilize sludges in double-shell tanks for in tank treatment or transfer to treatment facilities, and retrieve waste from miscellaneous underground tanks. The program will utilize known waste retrieval technical solutions to the maximum extent possible (e.g., sluicing, Savannah River mixer pumps, etc.) and develop and implement new technologies for waste retrieval (e.g., long-reach manipulators), as required. Preparations are underway for the initiation of sluicing retrieval of the first tank(106-C) in October 1997. The current baseline calls for the completion of retrieval of waste from all single-shell tanks by the end of 2018 and closure of the single-shell tank farms by September 2024.

Tank Waste Remediation System Waste Pretreatment

The objective of the tank waste remediation system waste pretreatment program is to separate tank waste into its low-level waste and high-level waste fractions by processing in new pretreatment facilities. Best available technology will be used to design the pretreatment facilities with the goal of minimizing the volumes of the high-level waste fraction and maximizing the radionuclides inventory in the high-level waste fraction. The pretreated low-level waste will be vitrified and disposed onsite. The pretreated high-level waste will be vitrified and stored onsite, until an offsite Federal geologic repository is available. Studies are currently underway to determine the waste separations processes and to select the pretreatment facility concepts. The current program baseline calls for the 1) start of hot operations of the Low-Level Waste Pretreatment Facility in December 2004, 2) start of hot operations of the High-Level Waste Pretreatment Facility in June 2008, and 3) completion of the pretreatment processing of Hanford tank waste by December 2028.

Tank Waste Remediation System Low-Level Waste (Vitrification)

The objective of the low-level waste program is to vitrify all low-level tank waste by the end of 2035 and, as a near-term contingency, maintain the Grout Facility in a standby condition. The program will utilize commercially available melters and other key processing technologies as much as possible. The program has contracts in place with several commercial melter vendors, and melter tests with Hanford waste simulants are currently being conducted. From the results of these tests, the reference melter and reference low-level glass formulation will be selected and incorporated into the design of the low-level waste vitrification facility. The current program baseline calls for the (1) initiation of hot operations of the Low-Level Waste Vitrification Facility by June 2005, and (2) completion of vitrification of Hanford low-level tank waste by December 2035. The vitrified low-level waste will be disposed of onsite in the 200 Areas at Hanford by the tank waste remediation system program.

In this analysis, the low-level waste costs resulting from treatment of high-level wastes are accounted as high-level waste activity costs. This approach is consistent with program planning at Hanford.

Tank Waste Remediation System High-Level Waste (Vitrification)

The objective of the high-level waste program is to vitrify all high-level tank waste by the end of 2035. The program will vitrify the high-level waste, place the vitrified waste in stainless steel canisters, and store the immobilized waste onsite until shipped to an offsite geologic

repository for disposal. Interface with the Savannah River vitrification facility and the repository program is ongoing. However, there currently exists much uncertainty in the program in the areas of canister size, waste loading, and disposition of the cesium and strontium capsules.

The current program baseline calls for the (1) initiation of hot operations of the High-Level Waste Vitrification Facility by December, 2009, and (2) completion of the vitrification of Hanford high-level tank waste by December, 2035. The vitrified high-level waste will be stored onsite until it is shipped to an offsite geologic repository for disposal.

The Hanford Site manages its transuranic, low-level, low-level mixed, and hazardous waste types within its liquid effluent and solid waste programs. The treatment activities associated with these programs are described in the following sections.

Liquid Effluent/Hanford Environmental Compliance

In 1986, the Department committed to Congress its facilities would eliminate the untreated discharge of radioactive liquid to the soil column by 1995. Subsequently in 1989, the Department, the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology entered into a formal compliance agreement governing planned actions for major effluent stream discharges. The agreement required implementation of best available technology for treatment of wastewater. In addition, it was agreed to permit the liquid effluent discharges under Washington State Department of Ecology regulations for disposal of wastewater discharges to the soil column. These agreements were formalized in a compliance order containing specific timetables for completion of the required upgrades. Based upon these agreements, the Department and Westinghouse Hanford Company are designing and constructing liquid waste treatment facilities for the Hanford Site. These facilities began operation in 1994, with additional facilities becoming operational from 1995 through 1997.

Current and future site liquid effluent streams, including liquid effluents from site cleanup activities, will be managed under a systems approach. An integrated liquid effluent treatment system using a combination of local and central treatment systems will be developed. Implementation responsibility of local treatment systems will remain with the generating programs; central treatment capabilities will be implemented by this program. This program is also responsible for closing liquid waste disposal sites and deactivating facilities required for centralized treatment capabilities.

Specific activities associated with these goals and responsibilities include:

- start, operate, and clean out the Liquid Effluent Retention Facility to support the operation of the 242-A Evaporator and the requirements identified in the Tri-Party Agreement;
- start and operate the 200 Area Effluent Treatment Facility to process the liquid inventory stored in the Liquid Effluent Retention Facility and other waste streams from plants in the 200 Area, and to support the continued operation of the 242-A Evaporator;
- start and operate the 200 Area Treated Effluent Disposal Facility to collect and treat certain effluent streams from the 200 Area using best available technology prior to disposal at a permitted facility;
- operate and maintain the 307 Basins as the collection and verification facility for the retention process sewer and the 340 Facility as the collection point for the low-level radioactive liquid waste system wastewaters, including waste regulated under the Resource Conservation and Recovery Act (RCRA);
- replace the existing 340 Facility Storage Vault to allow for RCRA compliance as a treatment and storage facility; and

- implement best available technology at Phase II stream facilities to treat effluents prior to disposal.

Solid Waste

The planned activities associated with the treatment portion of the solid waste program include:

- The processing of high-dose waste and high-dose contaminated equipment to meet applicable standards for disposal, storage, re-use, or free release. The equipment to be processed will consist of, as a minimum, tank farms long-length contaminated equipment, Plutonium-Uranium Extraction Plant towers, and contaminated equipment stored in the T-Plant canyon.
- The processing of low-level hazardous contaminated equipment to meet Debris Rule standards for disposal or free release, or decontaminate and repair equipment for return to service. The waste to be processed includes low-level waste generated at Hanford, either from facility operations or from the site cleanup effort.
- Characterization and sampling of low-level and mixed waste to confirm generator characterizations.
- Waste Receiving and Processing Module 1 will receive retrieved and newly generated solid contact handled radioactive waste (low-level, low-level mixed, and transuranic waste) in 55-gallon drums. Drums will be inspected, assayed, and opened if necessary. Waste contents will be sorted, analyzed, segregated, and repackaged. Waste found to be low-level will be disposed onsite. Waste that is found to be mixed or transuranic will be stored onsite to await further treatment or final disposal. Empty drums and waste will be compacted as appropriate.
- Waste Receiving and Processing Module 2A provides nonthermal treatment and repackaging for contact-handled low-level mixed waste.
- A facility (formerly known as Waste Receiving and Processing Module 2B) will receive retrieved and newly generated solid remote handled radioactive waste, and will also receive oversized contact-handled radioactive waste. This facility will be operated as a characterization, size reduction, treatment, and repackaging facility for the waste. Final scope of the facility will be addressed as part of the M-33 Tri-Party Agreement milestone.
- A Thermal Treatment Facility would provide treatment of that portion of the low-level and transuranic mixed waste requiring incineration to meet standards for offsite disposal. An acceptable alternative to construction of a Thermal Treatment Facility would be the use of an offsite vendor or other Departmental site for waste requiring thermal treatment. The use of an offsite entity would entail the eventual return of ash waste residue to the Hanford site for disposal (low-level waste) or storage (transuranic waste). This vendor approach was recognized as part of the Federal Facility Compliance Act Process and is subject to obtaining agreement from EPA and the State of Washington Department of Ecology.
- Metallic sodium inventory from the Hallam and Sodium Reactor Experiment reactors will be treated for disposal or reuse in accordance with State and land disposal restrictions prior to disposal or for reuse. The solid waste program provides for disposition of hazardous waste generated by onsite programs. The program is responsible for arranging for transportation of hazardous waste to an offsite treatment, storage or disposal site.

Waste Storage

High-Level Waste Storage

High-level waste storage at Hanford is a subset of the tank waste remediation system. Two programs are described below which address the operations, maintenance, and safety activities and tank farm upgrades.

Tank Waste Remediation System Operations, Maintenance and Safety

The objectives of the operations and maintenance and safety programs are to (1) provide safe operations of underground storage tanks and related facilities, (2) establish a final safety base in FY 2001, and (3) mitigate and solve waste tank safety issues. Ongoing activities with the operations and maintenance program include improvement to the tank farm conduct of operations, maintenance of tank

farm facilities, and operation of the 242-A Evaporator to achieve waste volume reduction of tank waste. In addition, the program is in the process of pumping interstitial liquids from the inactive single-shell tanks (interim stabilization) and disconnecting piping to prevent further liquid intrusion (isolation). The current baseline calls for the completion of single-shell tank interim stabilization by September 2000.

The waste tank safety program has the responsibility for resolution and mitigation of waste tank safety issues in the underground storage tanks. Safety issues for both single-shell and double-shell tanks have been raised. These issues are in the areas of flammable gas generation, organics, ferrocyanide, high heat, and criticality. Ongoing activities within the program include installation of upgraded temperature monitoring capability in ferrocyanide tanks, vapor characterization of all ferrocyanide and organic tanks, vapor space monitoring of all flammable gas tanks. A mixer pump has been installed in the highest priority flammable gas tank (101-SY). It has been determined this pump has successfully mitigated gas generation in the tank. The current baseline calls for the mitigation/ resolution of tank safety issues for high priority watch list tanks by September 2001.

Tank Waste Remediation System Tank Farm Upgrades

The objective of the tank farm upgrades program is to improve the tank farm infrastructure through implementation of planned capital projects and improve the technical integration and planning processes. The program currently has several ongoing construction projects. These include tank-farm ventilation upgrades, replacement of the cross-site transfer and aging waste transfer lines, and the design of new double-shell waste storage tanks. In addition, design activities are underway for upgrades to tank farm facilities for electrical, transfer systems, instrumentation systems, and double-shell tank ventilation systems. The current baseline states the tank farm upgrades will be completed by June 2010.

Spent Nuclear Fuel Storage

The spent nuclear fuel project is responsible for the continued safe, environmentally sound, and cost-effective storage of N-Reactor spent fuel stored in the K-Basins. N-Reactor fuel, from irradiation activities, includes 954 metric tons of heavy metal (in assembly form) encapsulated in 3,815 closed canisters stored in the 105 K-West Basin, and 1,146 metric tons of heavy metal (in assembly form) encapsulated in 3,667 open canisters stored in the 105 K-East Basin. There is also 0.5 metric ton of heavy metal of single pass reactor fuel in 185 elements at the 100 K-East and 100 K-West Basins remaining from the irradiation activities at the first 8 production reactors. The fuel in the 105 K-East Basin has experienced significant corrosion, resulting in sludge accumulation in the basin and the canisters. There may be some irradiated single pass reactor fuel elements remaining from previous storage in the sludge at the bottom of the N-Reactor Fuel Storage Basin.

Technical issues at the K-Basins include:

- the inadequacy of the K-Basins to support interim storage of N-Reactor fuel,
- the deteriorating condition of the N-Reactor spent fuel inventory, and
- the inadequate condition of major support systems at the K-Basins.

The spent nuclear fuel project is responding to these issues by:

- upgrading conduct of operations to comply with DOE Orders;
- providing safe existing storage and resolving vulner- abilities;

- involving stakeholders in decision-making for the spent nuclear fuel projects;
- implementing an N-Reactor fuel characterization program to better understand fuel condition;
- pursuing expedited removal of the fuel inventory from the K-Basins; and
- aggressively defining and pursuing implementation activities tied to the approved path forward, which aggressively manages N-Reactor fuel through interim storage.

The path forward provides for a facility to be used to stage, condition, and store the fuel. Removal of fuel from the K-Basins will start by December 1997, and the fuel will be removed from the K-Basins by December 1999. Fuel conditioning will be closely coupled with removal from the K-Basins. To expedite the removal, decisions for actions prior to interim storage will be determined by the environmental impact statement on near-term management of spent fuel from the K-Basins at the Hanford Site. The interim storage location will be determined by the Spent Nuclear Fuel Programmatic Environmental Impact Statement.

In addition to storage at the K-Basins, there are some materials remaining from fuel fabrication, including nonirradiated uranium, unclad metal billets, clad metal assemblies, and some scrap material in the 300 Area buildings. The 300 Area also has miscellaneous irradiated fuel from fuel fabrication testing activities, located in the 308 Building and fuel in the 324, 325, and 327 Buildings. The spent nuclear fuel project will manage these materials.

In addition to the fuel stored at the K-Basins, there is some nuclear material remaining from processing, including nonirradiated Fast Flux Test Facility fuel assemblies stored at Plutonium Finishing Plant and the Fast Flux Test Facility; and irradiated fuel from the Fast Flux Test Facility currently stored there. The site also has Shippingport PWR Core II unused and spent fuel from offsite commercial nuclear activities in association with the Energy Research and Development Administration, stored at T-Plant; and single pass reactor fuel from irradiation activities at the first eight production reactors at Hanford, consisting of 2.88 metric tons of heavy metal in 779 fuel elements stored at Plutonium-Uranium Extraction Plant. The spent nuclear fuel project will also manage these materials.

For this analysis, costs for disposal in a geologic repository were included. Disposal was assumed to be complete by 2035.

B Plant/WESF Cesium and Strontium Storage

The B Plant Complex program element is responsible for the safe, secure, and environmentally sound management of the B Plant and Waste Encapsulation Storage Facilities. The Waste Encapsulation Storage Facility currently stores 1137 cesium capsules and 601 strontium capsules from processing activities. The B Plant Complex is managed to provide containment of stored radioactive and hazardous materials until their final disposal. The mission of these facilities is in transition to a long-term, stable, minimum cost operation. B Plant is a treatment, storage, and disposal permitted facility and will continue as a solid/mixed waste interim storage and treatment facility for low-level liquid waste. The Waste Encapsulation Storage Facility is not a treatment, storage, and disposal permitted facility. Cesium capsules currently stored at B Plant, commercial irradiators, and selected cesium capsules from Department controlled facilities will be retrieved and stored at the Waste Encapsulation Storage Facility. Required activities include operating shipping casks used to transport radioactive material; oversight of tasks required to receive shipments from other facilities; and providing for disposition of capsules, pellets, and powder at Pacific

Waste Management Activity Costs

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030
Treatment							
High-Level Waste	339,167	507,960	472,192	410,176	301,784	222,088	75,208
Transuranic Waste	42,056	22,126	22,126	22,126	22,126	33,973	36,299
Low-Level Mixed Waste	21,288	72,471	72,471	72,471	72,472	106,545	80,249
Low-Level Waste	43,878	44,586	44,586	44,586	44,586	41,674	29,629
Storage and Handling							
High-Level Waste	346,700	151,096	74,256	57,120	44,744	34,136	16,592
Spent Nuclear Fuel	138,414	120,360	65,824	50,864	39,576	34,680	26,248
Transuranic Waste	85,586	47,696	32,933	32,933	32,933	32,960	33,054
Low-Level Mixed Waste	105,081	25,847	0	0	0	12,385	59,861
Low-Level Waste	36,964	10,506	0	0	0	1,596	7,716
Disposal							
High-Level Waste	0	0	0	0	0	204,000	204,000
Spent Nuclear Fuel	0	0	0	0	0	0	26,656
Low-Level Mixed Waste	1,335	4,649	10,138	4,854	3,168	3,105	3,005
Low-Level Waste	13,695	39,121	97,445	105,227	105,188	105,022	104,367
Hazardous Waste	45,741	35,119	35,308	35,092	35,107	35,093	35,081
Sanitary Waste	49,043	37,624	37,624	37,624	37,624	37,624	37,624
Other							
Decommissioning	0	0	0	34,211	34,211	49,327	60,466
Waste Management TSD	19,765	15,164	15,164	15,164	15,164	15,164	15,164
Inter-Site Disposal Assessment							
Low-Level Mixed Waste	-81	-2,424	-6,938	0	0	0	0
Low-Level Waste	-297	-526	-1,414	0	0	0	0
Total	1,288,334	1,131,376	971,716	922,448	788,683	969,374	851,219

	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Treatment								
High-Level Waste	0	0	0	0	0	0	0	11,982,040
Transuranic Waste	22,423	18,411	2,842	0	0	0	0	1,264,587
Low-Level Mixed Waste	60,053	8,334	0	0	0	0	0	2,853,054
Low-Level Waste	23,895	5,845	0	0	0	0	0	1,660,215
Storage and Handling								
High-Level Waste	0	0	0	0	0	0	0	3,969,923
Spent Nuclear Fuel	45,152	0	0	0	0	0	0	2,744,006
Transuranic Waste	33,011	29,708	13,592	1,745	0	0	0	1,966,336
Low-Level Mixed Waste	41,284	0	0	0	0	0	0	1,327,373
Low-Level Waste	5,321	0	0	0	0	0	0	347,485
Disposal								
High-Level Waste	197,200	197,200	0	0	0	0	0	4,012,000
Spent Nuclear Fuel	26,656	0	0	0	0	0	0	266,560
Low-Level Mixed Waste	2,577	1,533	0	0	0	0	0	173,154
Low-Level Waste	98,423	64,198	0	0	0	0	0	3,677,126
Hazardous Waste	35,081	35,081	35,081	14,032	0	0	0	1,924,827
Sanitary Waste	37,624	37,624	37,624	15,050	0	0	0	2,062,606
Other								
Decommissioning	54,101	54,101	0	0	0	0	0	1,432,080
Waste Management TSD	15,164	12,131	0	0	0	0	0	709,986
Inter-Site Disposal Assessment								
Low-Level Mixed Waste	0	0	0	0	0	0	0	-47,293
Low-Level Waste	0	0	0	0	0	0	0	-11,489
Total	697,966	464,165	89,140	30,827	0	0	0	42,314,577

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995 - 2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Northwest Laboratory and Oak Ridge National Laboratory. In addition, this activity provides for the encapsulation of single contained isotopes from Pacific Northwest Laboratory and Oak Ridge National Laboratory as required to meet Waste Encapsulation Storage Facility pool cell configuration requirements.

Solid Waste Storage

The planned activities associated with the storage portion of the solid waste program are:

- provide verification and sampling capabilities for low-level waste and mixed waste;
- maintain certification for at least one Government-owned liquid waste tank car. Liquid waste tank car services are essential to maintain less than 90-day storage requirements for facilities not having liquid waste storage permits and for transfer of liquid waste to other storage and disposal facilities;
- provide transuranic waste storage capacity at the Transuranic Storage and Assay Facility;
- provide storage capacity for low-level mixed waste, radioactive waste contaminated with PCBs, transuranic waste, and Greater-Than-Class-C waste at the Central Waste Complex;
- provide adequate remote handled waste storage capacity in the Special Case Waste Storage Facility for interim dry storage of non-regulated, remote-handled low-level and transuranic mixed waste;
- provide adequate mixed waste storage capacity to meet forecasted demands and treatment facility feed handling in the Phase V, Enhanced Radioactive and Mixed Waste Storage Facility. These facilities will provide interim and long term storage for waste and material handling capacities; and
- maintain adequate dangerous waste storage capacity in the Non-radioactive Dangerous Waste Storage Facility (616 Building) to provide Toxic Substances Control Act (TSCA) and RCRA interim storage and offsite shipment capabilities for non-radioactive dangerous waste per waste acceptance criteria 173-303 and TSCA.

Waste Disposal

High-Level Waste Disposal

Costs were included in this estimate for disposal of high-level waste in a deep geologic repository. Costs take the form of fees to be paid to the Office of Civilian Radioactive Waste Management.

Other Wastes

Liquid Effluent Disposal/Hanford Environmental Compliance

The 200 Area Treated Effluent Disposal Facility industrial sewer will collect the treated wastewater streams from various plants in the 200 Areas and dispose of the clean effluent at 2 new 20,235-square meter (5-acre) ponds permitted by Washington State.

The same facility will collect and dispose of treated liquids at a State approved land disposal structure selected to minimize the tritium migration time to the river.

The 300 Area Treated Effluent Disposal Facility provides collection, treatment, and disposal for laboratory wastewater, boiler blowdown, steam condensate, spent softener regenerant, and heating, ventilation, and air conditioning condensate generated in the 300 Area. The treated wastewater is discharged to the river under the conditions of a National Pollutant Discharge Elimination System permit. Solid waste generated from the 300 Area liquid effluent treatment process will be shipped to a landfill.

Solid Waste Disposal

Disposal functions provide for the ultimate disposition of the radioactive solid waste both on and off the Hanford Site. Disposal facility performance is based on the level of

containment required for the particular type of waste being disposed. Separate disposal functions are identified for transuranic waste, low-level mixed waste, and low-level waste.

The disposal of transuranic waste is planned for the Waste Isolation Pilot Plant site in New Mexico; the destination for Greater-Than-Class-C waste has not yet been determined.

Radioactive Mixed Waste Disposal Trenches will provide disposal capability for low-level mixed waste. The 200 Area solid radioactive mixed waste will be drummed and sent to interim storage at the central waste complex awaiting future treatment. These operations will be conducted in RCRA permitted facilities under the regulatory authority of EPA and the State of Washington Department of Ecology. The Low-Level Burial Grounds in the 200 Area will continue to provide disposal capability for low-level waste for the duration of the Hanford life cycle. Hazardous wastes are shipped offsite for commercial treatment and disposal. These practices are in accordance with the RCRA and Washington State Administrative Code regulations.

On-site solid waste costs are adjusted (negative numbers in the waste management tables) to reflect funding transferred to the Hanford Site to account for costs associated with the disposal of environmental restoration activity waste generated at other Departmental facilities.

NUCLEAR MATERIAL AND FACILITY STABILIZATION

The nuclear material and facility stabilization process began at Hanford in 1995. Of the 379 Hanford facilities scheduled to undergo this process, 311 facilities have already begun stabilization. Some of these facilities include the Applied Chemistry and Plutonium Laboratories; plutonium, uranium, and chemical storage facilities; Plutonium-Uranium Extraction Canyon and Material Plant; and N-fuel and reactor fuel manufacturing facilities. It is assumed for purposes of this report the remaining 68 facilities will incrementally begin the stabilization process in 1996. These facilities include the Fast Flux Test Facility, the Uranium-

Nuclear Material and Facility Stabilization Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle**
Nuclear Material and Facility Stabilization	168,476	85,483	99,719	19,087	19,790	3,548	158	2,149,786

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

Oxide Plant, contaminated storage facilities facilities; reactor service facilities; and the radiosurgery facility. The resulting waste types from the stabilization of these facilities will include: low-level mixed, high-level, transuranic, low-level, and hazardous waste. This report arbitrarily assumes the nuclear material and facility stabilization process at Hanford will be completed by 2027.

The preceeding table represents how the Hanford facilities have been categorized for the facility stabilization and maintenance portion of the cost estimate. The first column of the table identifies the cost model categories, the second column identifies the number of applicable facilities, and the third column identifies the total cost for performing the surveillance, maintenance, and deactivation for each cost category (FY 1995 direct dollars only).

LANDLORD FUNCTIONS

The landlord program is responsible for replacement or enhancement of the Hanford Site general-purpose facilities and infrastructure systems in support of all mission areas. Included are buildings, systems, and equipment that by design or use are not dedicated to a single program mission. The program material management responsibilities are currently limited to managing various nonradioactive contaminated facilities, including both surplus and active general purpose buildings. Disposal responsibilities concentrate on decommissioning of the nonradioactive general use facilities.

PROGRAM MANAGEMENT

Program Management includes all activities performed by general support services contractors. The funding for these activities is

Landlord Cost Estimate

Five-Year Averages (Thousands of Constant 1995 Dollars)*

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Directly Appropriated Landlord	85,314	109,467	109,467	109,467	109,467	109,467	109,467	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Directly Appropriated Landlord	18,588	18,588	18,588	18,593	18,600	12,840	9,000	4,324,881

** Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.*

*** Total Life Cycle is the sum of annual costs in constant 1995 dollars.*

also used to provide grants to the States and Indian Tribes, as well as funding for the Hanford Advisory Board, downwinder litigation, and payment in lieu of taxes to the local counties.

Program support costs associated with a direct program onsite (e.g., tank waste remediation systems) are included within the program dollars under the appropriate headings and are not included in the Program Management section.

Hanford Environmental Management Program

The Hanford environmental management program was established in 1986 to incorporate a structured approach toward achieving environmental compliance at the Hanford Site. The program scope focuses on regulatory compliance support through the identification and resolution of site-wide environmental issues, providing guidance to facilities on compliance activities, coordinating site-wide report preparation and providing integration of Tri-Party Agreement activities. Current planned activities are scheduled through FY 2000 with similar ongoing regulatory activities assumed until cleanup is complete.

Site Planning & Integration

The Hanford site planning and integration activities provide integrated baseline management over the execution of work at Hanford. The top-level, long-range planning document is the Hanford Strategic Plan, which provides overall direction and also provides information to drive the subsequent development of the Hanford Mission Plan.

RCRA Monitoring

The RCRA and operational monitoring program is responsible for monitoring of ground water, air emissions, and surface areas surrounding the RCRA treatment, storage, and disposal facility either permitted or seeking a permit; and operational facilities regulated by DOE orders and the Atomic Energy Act to ensure continued safe, environmentally sound, and cost-effective treatment, storage, and disposal of hazardous and radioactive materials and waste at the Hanford Site.

The objectives associated with the RCRA and operational monitoring program are to

- repair, maintain, and decommission ground-water wells to ensure valid and consistent sampling of the ground water;
- utilize contracted laboratory services for impartial analysis of samples;
- operate, maintain, and perform surveillance of both active and inactive waste sites to monitor and quantify potential contamination spread;
- operate gaseous effluent monitoring systems for Plutonium-Uranium Extraction Plant, PFP, 222-S Lab, tank farms, and Uranium Oxide facilities;
- operate and maintain the seismic array for Hanford and Eastern Washington in conjunction with the University of Washington; and
- operate and maintain near field environmental monitoring and reporting of events, as required by law.

Specific planning for this area currently has been completed through the year 2000, and it is anticipated activities of similar complexity and cost will continue throughout the life cycle.

Analytical Services

Analytical Services are guided by the overall mission as outlined in the Hanford Mission Plan and by requirements outlined in the Tri-Party Agreement. Hanford Site programs will define analytical services requirements. Construction of new laboratories, enhancements to existing laboratories and multiple

commercial laboratory contracts are crucial elements of the analytical services program. Analytical services works directly with program clients to estimate the needed analytical support. This includes participation in the data quality objectives process and joint development of the statements of work. Laboratory services include consulting on sampling, field screening, and recommendations or appropriate analyses; conduct of analyses to strict procedure control; data and report preparation; followup client assistance; and adherence to strict quality control.

FUNDING AND COST INFORMATION

The following tables present funding information and major activity milestones for Hanford.

Program Management Cost Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Program Management	106,227	444,461	398,256	382,879	343,488	396,480	357,932	
	2035	**2040**	**2045**	**2050**	**2055**	**2060**	**2065**	**Life Cycle****
Program Management	225,269	166,818	73,062	28,154	5,000	2,000	0	14,756,358

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Defense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Environmental Restoration	142,745	150,037	162,694	174,817	170,141	157,446	179,463	
Waste Management	1,276,005	1,123,134	970,419	913,375	780,948	959,832	842,859	
Nuclear Material and Facility Stabilization	168,287	85,366	97,443	14,878	19,606	3,206	0	
Directly Appropriated Landlord	85,314	109,467	109,467	109,467	109,467	109,467	109,467	
Program Management	105,355	441,292	396,886	379,596	340,599	393,061	354,898	
Total	1,777,707	1,909,296	1,736,909	1,592,133	1,420,760	1,623,012	1,486,687	
	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Environmental Restoration	237,541	251,809	206,599	18,349	13,306	7,400	0	9,504,470
Waste Management	691,138	459,645	88,248	30,519	0	0	0	41,956,618
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	2,112,214
Directly Appropriated Landlord	18,588	18,588	18,588	18,593	18,600	12,840	0	4,324,881
Program Management	223,562	165,688	72,839	28,077	5,000	2,000	0	14,649,620
Total	1,170,829	895,730	386,274	95,537	36,906	22,240	0	72,637,804

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-1996, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Nondefense Funding Estimate

*Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	
Waste Management	12,329	8,242	1,297	9,073	7,735	9,542	8,361	
Nuclear Material and Facility Stabilization	189	117	2,277	4,209	184	342	158	
Program Management	872	3,169	1,370	3,283	2,889	3,419	3,034	
Total	13,391	11,528	4,943	16,565	10,809	13,304	11,552	
	2035	2040	2045	2050	2055	2060	2065	Life Cycle**
Waste Management	6,828	4,520	891	308	0	0	0	357,958
Nuclear Material and Facility Stabilization	0	0	0	0	0	0	0	37,572
Program Management	1,707	1,130	223	77	0	0	0	106,738
Total	8,535	5,650	1,114	385	0	0	0	502,268

* Costs reflect a five-year average in constant 1995 dollars, except in FY 1995-2000, which is a six-year average.

** Total Life Cycle is the sum of annual costs in constant 1995 dollars.

Major Activity Milestones

ACTIVITY	TASK	COMPLETION DATE
Environmental Restoration		Fiscal Year
100 Area:		
	Initiate First Reactor Cleanup (BC Reactor)	1995
	M-16-94-04-T02 Completion Pretreatment & Removal of All N Reactor Fuel Storage Basin Waters	1997
	Complete 100 Area Assessment	2000
	Complete 100 Area Remediation	2025
	Complete 100-F Decommissioning Activities	2043
200 Area:		
	M-70-00 ERDF To Be Operational	1996
	Complete 200 Area Assessment	1996
	Complete 200-East Decommissioning Activities (221-B Plant/WESF)	2044
	Complete 200 Area Remediation	2045
	Complete 200 Area Cleanup (including Decommissioning)	2047
	Complete 200-West Decommissioning Activities (221-T Process Plant)	2057
300 Area:		
	Complete 300 Area Assessment	1995
	Complete 300 Area Remediation	2035
	Complete 300 Area Cleanup (including Decommissioning)	2050
1100 Area:		
	Complete 1100 Area Cleanup (including Decommissioning)	1995
	Complete 1100 Area Remediation	1996
Waste Management		Fiscal Year
Treatment:		
Tank Waste Remediation System Waste Pretreatment:		
	Initiate Hot Operations of the Low-Level Waste Pretreatment Facility	2004
	Initiate Hot Operations of the High-Level Waste Pretreatment Facility	2008
	Complete the Pretreatment Processing of Hanford Tank Waste	2028
Tank Waste Remediation System Low-Level Waste (Vitrification):		
	Initiate Hot Operations of the Low-Level Waste Vitrification Facility	2005

Major Activity Milestones (Continued)

ACTIVITY	TASK	COMPLETION DATE
Waste Management		Fiscal Year
Treatment:		
Tank Waste Remediation System Waste Pretreatment:		
	Initiate Hot Operations of the Low-Level Waste Pretreatment Facility	2004
	Initiate Hot Operations of the High-Level Waste Pretreatment Facility	2008
	Complete the Pretreatment Processing of Hanford Tank Waste	2028
Tank Waste Remediation System Low-Level Waste (Vitrification):		
	Initiate Hot Operations of the Low-Level Waste Vitrification Facility	2005
	Complete Vitrification of Hanford Low-Level Tank Wastes	2035
Tank Waste Remediation System High-Level Waste (Vitrification):		
	Initiate Hot Operations of the High-Level Waste Vitrification Facility	2009
	Complete Vitrification of Hanford High-Level Tank Waste	2035
Tank Waste Remediation System Characterization and Waste Retrieval:		
	Issue Tank Characterization Reports for 177 Hanford High-Level Waste Tanks	1999
	Retrieve Waste from all Remaining Single-Shell Tank Farms	2018
	Complete Closure of All Single-Shell Tank Farms	2024
Liquid Effluent:		
	Initiate 200 Area Effluent Treatment Facility Operations	1995
	Complete Construction of project W-007H, B Plant Process Condensate Facility	1995
	Complete Construction of Project W-291; 200 Areas Effluent Best Available Technology (BAT)/All Known and Reasonable Technology (AKART) Implementation	1995
Solid Waste:		
	Initiate Operation of WRAP 1	1997
	Initiate Mixed Waste Stabilization Treatment contract	1999
Storage And Handling		Fiscal Year
Tank Waste Remediation Systems Operations, Maintenance and Safety:		
	Close all Unreviewed Safety Questions for DSTs and SSTs	1998
	Complete Single-Shell Tank Interim Stabilization	2000

Major Activity Milestones (Continued)

ACTIVITY	TASK	COMPLETION DATE
Tank Waste Remediation System Tank Farm Upgrades:		
	Complete Construction of project W-030 Tank Farm Ventilation Upgrades	1996
	Complete Construction of Project W-058 Replacement of Cross-Site	1997
	Mitigate/Resolve Tank Safety Issues for High Priority Watch List Tanks	2001
	Complete Construction of Project W-314A Tank Farm Integrated Instrumentation System Upgrades	2002
	Complete Construction of Project W-314B Double-Shell Tank Ventilation Upgrade	2002
	Complete Construction of Project W-314C Transfer System Upgrades	2003
	Complete Construction of Project W-314d Tank Farm Electrical Upgrade	2004
	Complete Tank Farm Upgrades	2010
K-Basins:		
	Initiate Removal of Fuel from the K Basins	1997
	Complete Removal of Fuel from the K Basins	1999
	Complete Storage of K-Basins SNF	2035
Solid Waste:		
	Start Definitive Design for Phase V Mixed Waste Storage Facility	1995
	Initiate Retrieval Operations of TRU Waste from 200E Burial Grounds	1998
	Complete Construction for Phase V Mixed Waste Storage Facility	2000
	Complete Solid Waste Storage	2035
Other:		
	Complete B-Cell Cleanout	2001
Disposal		Fiscal Year
High-Level Waste (Tank Waste Remediation System):		
	Complete HLW Vitrification at HWVP	2035
	Ship Final High-Level Waste Canisters to Offsite Geologic Repository for Disposal	2040
Low-Level Waste:		
	Complete LLW Vitrification	2035
	Complete LLW Disposal	2040
	Complete LLMW Disposal	2040

Major Activity Milestones (Continued)

ACTIVITY	TASK	COMPLETION DATE
Liquid Waste:		
	Complete Construction of W-049H: 200 Area Treated Effluent Disposal Facility (TEDF)	1995
Transuranic Waste		
	Complete TRU Waste Disposal	2049
Spent Nuclear Fuel:		
	Complete Disposal for SNF	2035
Hazardous Waste:		
	Complete Disposal of Hazardous Waste from WM	2047
Nuclear Material And Facility Stabilization		Fiscal Year
	UO_3 Plant Deactivation Completed	1995
	Commerce Fuel Wash & Transfer to Dry Storage	1995
	Complete ORNL Ship of WESF Residue	1998
	Nuclear Material and Facility Stabilization Completed	2027
	Complete RCRA and Operations Monitoring	2035
	Complete Landlord Activities	2047

For further information on this site, please contact: *Public Participation Office* *(509) 376-7501*
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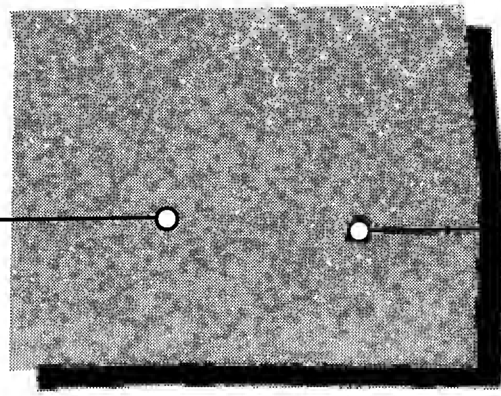
Technical Liaison: Kerry Cameron *(509) 376-8035*



*Summaries are not provided for facilities with completed remedial actions. Any ongoing surveillance and monitoring costs for these facilities are provided in the table below.

WYOMING

Estimated State Total

(Thousands of Current 1995 Dollars)*

	FY 1995	1996	1997	1998	1999	2000
Completed UMTRA Surveillance & Monitoring	600	1,370	630	1,090	2,530	7,020

* *Costs for FY 1995 reflect Congressional Appropriation, costs for FY 1996 reflect EM budget submission, costs for FY 1997-2000 reflect Budget Shortfall Scenerio, costs for shaded area assume 3% ennual inflation.*

Five-Year Averages (Thousands of Constant 1995 Dollars)**

	FY 1995 - 2000	2005	2010	2015	2020	2025	2030	Life Cycle***
Completed UMTRA Surveillance & Monitoring	2,342	1,999	1,135	1,260	0	0	0	36,027

** *Costs reflect a five-year average in constent 1995 dollars, except in FY 1995 - 2000, which is e six-year average.*

*** *Total Life Cycle is the sum of ennual costs in constent 1995 dollars.*

Glossary

Actinides. Elements with atomic numbers from 90 to 103.

Alternative cases. Alternative cases reflect ways the base case could change if various policy decisions were made. The cases examine four areas most likely to affect total costs: (1) land use, (2) program scheduling, (3) technology development, and (4) waste management configuration.

Base case. The primary total program estimate in the 1995 Baseline Report that best represents the most likely activities and costs under current projections.

Baseline. A quantitative expression of planned costs, schedule, and technical requirements for a defined project. Baselines should include criteria to serve as a standard for measuring the status of resources and the progress of a project.

Baseline Environmental Management Report (Baseline Report). Congressionally mandated report prepared by the Secretary of Energy to estimate the cost and schedule of cleaning up the Nation's nuclear weapons complex.

Bioremediation. The process of using microorganisms to degrade or break down hazardous materials. The Department of Energy has used this remediation technique on Environmental Management projects.

Canyon. A slang term for a chemical separations plant; inspired by the plant's long, high, narrow structure. Not all chemical separations plants are canyons.

Chemical separation. A process for extracting uranium and plutonium from dissolved spent nuclear fuel and irradiated targets. The fission products that are left behind are high-level waste. Chemical separation is also known as reprocessing.

Cold War. A conflict over ideological differences (the United States and the former Soviet Union) carried on by methods short of sustained military action."

Cold War Mortgage. The cost and effort associated with addressing the unprecedented environmental legacy of 50 years of nuclear weapons production.

Comprehensive Environmental Response, Compensation and Liability Act. A Federal law, enacted in 1980, that governs the cleanup of hazardous, toxic, and radioactive substances. The Act and its amendments created a trust fund, commonly known as Superfund, to finance the investigation and cleanup of abandoned and uncontrolled hazardous waste sites. Also commonly referred to by its acronym, CERCLA.

Constant dollars. Constant dollars represent a dollar value adjusted for changes in prices. Dollars in the future are adjusted by stripping out inflation by dividing current dollar amounts by an appropriate index, a process known as deflating. The result is a constant dollar series as it would exist if prices and transactions were the same in all subsequent years as the base year. Any changes in such a series would reflect only changes in the real volume of goods and services. The Baseline Report cost projections are in constant dollars.

Current dollars. Current dollars represent the dollar value of goods or services in terms of prices current at the time the goods or services were sold (inflation factors are present).

Decommissioning. Retirement of a nuclear facility, including decontamination and/or dismantlement.

Decontamination. Removal of unwanted radioactive or hazardous contamination by a chemical or mechanical process.

Department of Energy. The cabinet-level U.S. Government agency responsible for nuclear weapons production and energy research and the cleanup of hazardous and radioactive waste at its sites. It was created from the Energy Research and Development Administration and other Federal Government functions in 1977.

Discounting. The process of converting a stream of returns or costs incurred over time to a single present value.

End-States. The state that exists after a site has been treated or remediated.

Enriched uranium. Uranium that, as a result of the process of enrichment, has more uranium-235 than natural uranium.

Environmental contamination. The release into the environment of radioactive, hazardous, and toxic materials.

Environmental Impact Statement. A report that documents the information required to evaluate the environmental impact of a project. Such a report informs decisionmakers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the environment.

Environmental Management program. An Office of the Department of Energy that was created in 1989 to oversee the Department's waste management and environmental cleanup efforts. Originally called the Office of Environmental Restoration and Waste Management, it was renamed in 1993.

Environmental Protection Agency. A Federal agency responsible for enforcing environmental laws, including the Resource Conservation and Recovery Act; the Comprehensive Environmental Response, Compensation and Liability Act; and the Toxic Substances Control Act. The Environmental Protection Agency was established in 1970.

Environmental restoration. Environmental restoration is usually described as "cleanup." But it encompasses a wide range of activities, such as stabilizing contaminated soil; treating ground water; decommissioning process buildings, nuclear reactors, chemical separations plants, and many other facilities; and exhuming sludge and buried drums of waste.

Federal Facility Compliance Act. A Federal act that requires the Department to develop and submit to States or the U.S. Environmental Protection Agency plans for developing mixed-waste treatment capacity and technologies.

Fissile. Capable of being split by a low-energy neutron. The most common fissile isotopes are uranium-235 and plutonium-239.

Fissile material. A specific set of nuclear materials, such as uranium-235 and plutonium-239, that may be used in making a nuclear explosive for a weapon. It does not include fissile materials present in spent nuclear fuel or irradiating targets from reactors.

Formerly Utilized Sites Remedial Action Program (FUSRAP). This Federal program was initiated in 1974 to identify and remediate sites around the country that were contaminated during the 1940's and 1950's as a result of research and development, processing and production of uranium and thorium, and storage of processing residues.

Gaseous diffusion. The process used to make enriched uranium in the United States.

Geologic repository. The Department plans to build a geologic repository to dispose of high-level waste. The repository is yet to be built. A site for a repository has been identified but not yet approved. The repository is not expected to start accepting Departmental wastes before the year 2016.

"**Greenfields.**" The most unrestricted alternative case characterized by actively removing or destroying contaminants in all media. These cases are "ideals" impractical to implement as alternatives.

Half-life. The half-life of a radioactive isotope is the time it takes for a quantity of that isotope to lose half of its radioactivity. A half-life is the time it takes for half the number of atoms in a sample to undergo radioactive decay.

Highly enriched uranium. Uranium with more than 20 percent of the uranium-235 isotope, used for making nuclear weapons and also as fuel for some isotope-production, research, and power reactors. Weapons-grade uranium is a subset of this group.

In situ. In place.

"**Iron fence.**" The most-restricted alternative case for land use. Iron fence is characterized by containing, rather than actively remediating, contaminated sites. This means that soil and buried waste sites would be capped, ground-water contamination would be controlled from spreading by hydraulic controls and barriers, and facilities would be entombed.

Irradiate. To expose to ionizing radiation, usually in a nuclear reactor. Targets are irradiated to produce isotopes.

Isotopes. Forms of the same chemical element that differ only by the number of neutrons in their nucleus. Most elements have more than one naturally occurring isotope. Many isotopes have been produced in reactors and scientific laboratories.

Land use. The ultimate uses to be permitted for currently contaminated lands, waters, and structures at each Department of Energy installation. Land-use decisions will strongly influence the cost of environmental management.

Landlord. Activities that involve the physical operation and maintenance of Department of Energy installations. Specific tasks vary from installation to installation but generally include provision of utilities, maintenance, and general infrastructure for the entire installation.

Life-cycle cost estimate. The cost to complete the mission of the Environmental Management program.

Manhattan Project. The U.S. Government project that produced the first nuclear weapons during World War II. Started in 1942, the Manhattan Project formally ended in 1946. The Hanford Site, Oak Ridge Reservation, and Los Alamos National Laboratory were created for this effort. Named for the Manhattan Engineer District of the U.S. Army Corps of Engineers.

National Defense Authorization Act. The Federal law, enacted in 1994, that required the Secretary of Energy to prepare the Baseline Report. See Appendix A for a description of what the Act required.

National Environmental Policy Act. A Federal law, enacted in 1970, that requires the Federal Government to consider the environmental impacts of, and alternatives to, major proposed actions in its decisionmaking processes. Commonly referred to by its acronym, NEPA.

Nonproliferation. Efforts to prevent or slow the spread of nuclear weapons and the materials and technologies used to produce them.

Nuclear material and facility stabilization. An Environmental Management subprogram that manages the transfer to Environmental Management of the responsibilities and facilities that formerly belonged to the nuclear weapons program. Several sites already have been transferred to Environmental Management for deactivation and subsequent cleanup. As other sites are transferred to Environmental Management, the existing resources (funding and personnel) also will be transferred to Environmental Management.

Nuclear reactor. A device that sustains a controlled nuclear fission chain reaction.

Nuclear weapons complex. The chain of foundries, uranium enrichment plants, reactors, chemical separation plants, factories, laboratories, assembly plants, and test sites that produces nuclear weapons. Sixteen major U.S. facilities in 12 States formed the nuclear weapons complex.

Operable unit. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site.

Plutonium. A man-made fissile element. Pure plutonium is a silvery metal that is heavier than lead. Material rich in the plutonium-239 isotope is preferred for manufacturing nuclear weapons, although any plutonium can be used. Plutonium-239 has a half-life of 24,000 years.

Production reactor. A nuclear reactor designed to produce manmade isotopes. Tritium and plutonium are made in production reactors. The United States has 14 such reactors: 9 at the Hanford Site and 5 at the Savannah River Site. Some research reactors are also used to produce isotopes.

Polychlorinated biphenyls (PCBs). A group of commercially produced organic chemicals used since the 1940's in industrial applications throughout the nuclear weapons complex. Most notably, PCBs are found in many gaskets and large electrical transformers and capacitors in the gaseous diffusion plants. PCBs have been proven to be toxic to both humans and laboratory animals.

Present Value. The sum that, when available now and invested at a prevailing interest rate, will equal a given value at a defined date in the future.

Program direction. Activities that include salaries and benefits for all Federal full-time equivalents at Headquarters and the field officies.

Program management. Activities that include planning, monitoring, and reporting of ongoing activities, cost/schedule tracking, clerical, other administrative support, and grants to States and localities.

Program scheduling. How environmental management activities will be prioritized and how rapidly the money will be spent. One of the four alternative cases analyzed as part of the Baseline Report.

Radioactive. Of, caused by, or exhibiting radioactivity.

Radioactivity. The spontaneous emission of radiation from the nucleus of an atom. Radionuclides lose particles and energy through this process.

Radioisotope. A radioactive isotope.

Record of Decision (ROD). A public document that explains which cleanup alternatives will be used at National Priorities List sites where, under CERCLA, trust funds pay for the cleanup.

Radionuclide. A radioactive species of an atom. For example, tritium, strontium-90, and uranium-235 are radionuclides.

Reprocessing. Synonymous with chemical separations.

Research reactor. A class of nuclear reactors used to do research into nuclear physics, reactor materials and design, and nuclear medicine. Some research reactors also produce isotopes for industrial and medical use.

Residual contamination standards. The amount and concentrations of contaminants in soil, water, and other media that will remain following environmental management activities. One of the four alternative cases analyzed as part of the Baseline Report.

Resource Conservation and Recovery Act (RCRA). A Federal law enacted in 1976 to address the treatment, storage, and disposal of hazardous waste.

Rocky Flats Environmental Technology Site. Plutonium processing and manufacturing plant located 21 miles northwest of Denver, Colorado. Rocky Flats made the plutonium triggers of nuclear weapons. Started operations in 1951.

Saltcake. A cake of dry crystals of nuclear waste found in high-level waste tanks.

Site characterization. An onsite investigation at a known or suspected contaminated waste or release site to determine the extent and type(s) of contamination.

Spent nuclear fuel. This includes all nuclear fuel generated by Department of Energy production reactors, university and Government research reactors, foreign research reactors that use fuel of U.S. origin, and naval nuclear propulsion reactors.

Stakeholder. Anyone interested in, or affected by, Department of Energy activities. Stakeholders have varying levels of concern about the Environmental Management program and varying levels of expertise.

Superfund. A term commonly used to refer to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Surplus Facility Inventory Assessment. A 2-year assessment, beginning in October 1993, that baselines the Department's surplus inventory and the effort to characterize those assets for transfer to the Office of Environmental Management.

Technology development. Technology development considers how future technologies may influence programs costs. One of the four alternative cases analyzed as part of the Baseline Report.

Unadjusted total life-cycle costs. Total life-cycle costs without productivity savings.

Uranium. The basic material for nuclear technology. It is a slightly radioactive naturally occurring heavy metal that is more dense than lead. Uranium is 40 times more common than silver.

Uranium mill. A plant where uranium is separated from ore taken from mines.

Uranium mill tailings. The sandlike materials left over from the separation of uranium from its ore. More than 99 percent of the ore becomes tailings.

Vitrification. The process by which waste is transformed from a liquid or sludge into an immobile solid—trapping radionuclides and preventing waste from contaminating soil, ground water, and surface water. The Department of Energy has selected vitrification processes to solidify and stabilize certain forms of radioactive and hazardous waste. This process does not reduce radioactivity. Borosilicate glass is the material that the Department of Energy will use to immobilize its high-level radioactive waste.

Waste Isolation Pilot Plant. A geologic repository intended to provide permanent disposal deep underground for transuranic waste. The Waste Isolation Pilot Plant is expected to open in 1998 if approved.

Waste management. Waste management includes treating, storing, and disposing of a variety of wastes, including high-level radioactive waste, transuranic waste, low-level radioactive waste, and low-level mixed waste, hazardous chemical waste, and sanitary waste.

Waste management configuration. Refers to Department of Energy installations that will treat, store, and dispose of wastes. Waste management configuration is one of five alternative cases analyzed as part of the Baseline Report.